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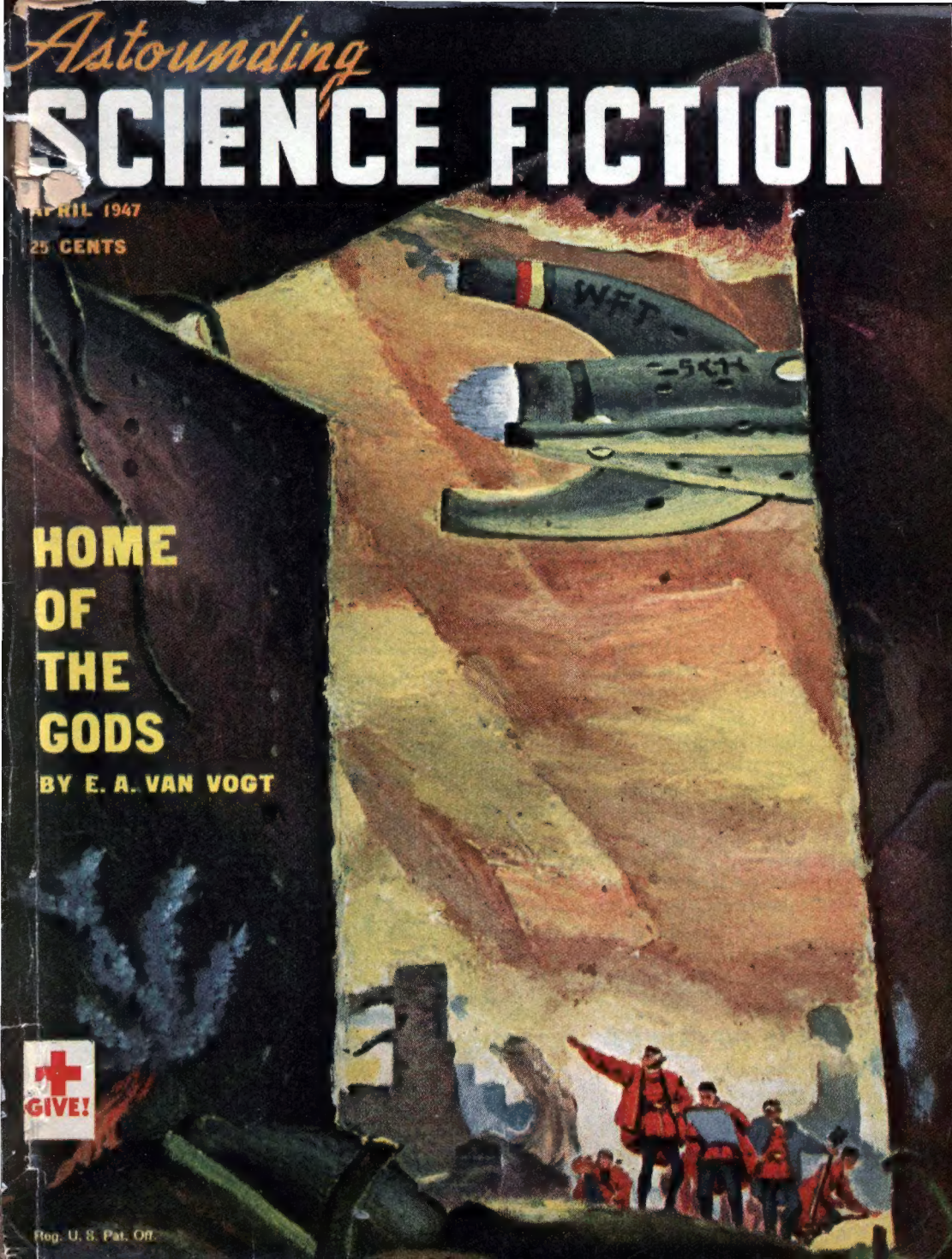

HOME OF THE GODS

BY E. A. VAN VOGT

GIVE!

Reg. U. S. Pat. Off.

At the end of many a rainbow—

IF YOU GO to the end of a rainbow, so the fairy tales say, you'll find a pot of gold.

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Astounding
SCIENCE FICTION

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Editor
JOHN W. CAMPBELL, JR.

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NEXT ISSUE ON SALE APRIL 15, 1947

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NEW ART

At the Museum of Science and Industry in New York City there is a replica of the first metal planing machine. Essentially, a metal plane is a simple gadget; a flat bedplate and a metal cutting tool move with respect to each other, back and forth, the tool cutting a smooth trace. Gradually work and tool are moved from one side to the other, so that a flat, smooth surface results. The flat bedplate of the first of the machine planers, however, shows the marks of cold chisel and file; there were no planers to plane the bedplate of that first planer—it had to be hand-carved from block steel, smoothed laboriously, by much measurement, checking, careful chiseling and filing.

Getting the first example of a new art started is a terrific problem; the miracle of radar is not that it works—Heinrich Hertz proved that more than a half-century ago—but that the equipment to make it work was developed, practically from scratch, in less than four years. A sort of radar—useful of course—did exist before 1941. It used relatively long waves—about 1.5 meters—and great cumbersome equipments, had short range, and was useless to detect low-flying planes. It was easily confused by ground-clutter, reflections from the ground, when pointed anywhere near the horizon. Radar wasn't the thing we think of today until microwave techniques came in. In the January, 1941, editorial, we pointed out that for one side in a war to gain scientific superiority over another, the two scientific forces had to be separated for a while, during which advances in newly opened fields of science would progress along separate and divergent lines. At that time, we suggested there were two major fields to be explored, and in which divergence could become important and of decisive weight; microwave radio and atomic engineering.

The reasons why these two fields were picked is easy to see; the klystron had just opened a way into the microwave spectrum, and the discovery of U-235 fission to atomics. The story of the Manhattan Project has been told, but the story of the Radiation Laboratory is less well appreciated. Yet the work of the Radiation Laboratory far better represents the real and general problem of opening a new art.

First, the klystron worked—but not well enough. It wouldn't develop the power needed. Hertz had shown that microwave energy would do what they wanted to do—he'd worked with exactly the range of frequencies used in the most modern

microwave equipment. But he'd worked in distances measured in feet, without quantitative requirements. They had to work in miles—hundreds of 'em—and with the utmost quantitative refinement; the returning echo must be timed to a small fraction of a microsecond.

The development of the cavity magnetron gave the researchers a source of power at the high frequencies involved—10,000,000,000 cycles per second and even 30,000,000,000 cycles per second. Now, however, they began the real problem. Ordinary electric power you can conduct down a wire. Even radio energy of the ordinary type is wired. But not this stuff; it will radiate from a wire one inch long, with no output at the "far" end. You have to pipe it. The pipes, though, have very special qualifications; a scratch on the inside of the pipe will reflect the energy more efficiently than a 100-mile distant plane, so the pipe must be just precisely *so*. Even when we have a means of generating and conveying the energy—how do you measure the frequency? If you do know the frequency, how do you measure the power output? Not with a wattmeter, you don't! And in alternating current, 100 amperes and 1000 volts may mean 100,000 watts or it may mean precisely nothing. Depends on the phase relationship of voltage and current; both are varying from maximum to zero to negative max to zero. If the 100 amperes is flowing when the voltage is zero, that's no power at all; if the 1000 volts occurs when the current is zero—no power. So measuring voltage and current won't tell you what the wattage—the actual power—is. At ten billion cycles, the problem gets tough.

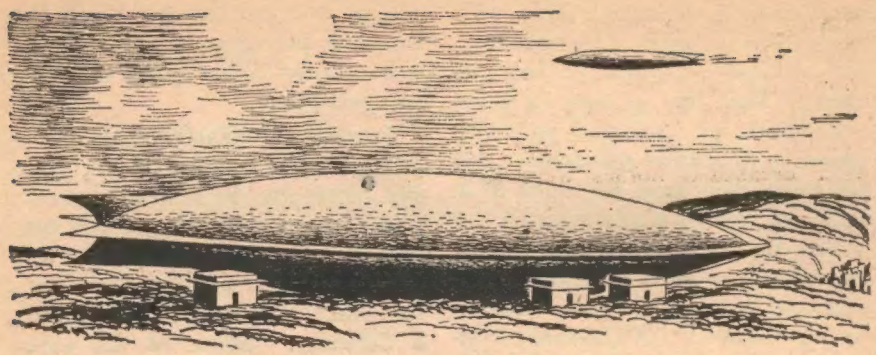
Further, 10,000,000,000 cycles means a wave length of 3 cm. Usually when you distrust voltage-current power measurements, you convert the electric power to heat, and read the heat energy; that can't fool you. This time, though, there's a difficulty. Some of the super radars delivered 4,000,000 watts peak output. Since the wave length was a few centimeters, all the equipment was necessarily small—measured in centimeters, too.

Problem: How do you dissipate 4,000,000 watts of raw heat in something 3 cms. long?

Those frequencies reflect from almost any irregularity or discontinuity of medium—that's why radar works. But they'll cheerfully reflect in insane ways inside the apparatus. When they do, all hell's out for noon, if you're monkeying with 4,000,000 watts. Snow's soft, weak stuff—but a shotgun barrel will peel open like a used banana if there's a little snow in the barrel to reflect the shock wave of firing. High power radar sets won't do that—but internal reflections can upset things more than somewhat.

New arts are invariably practically pure headache; the first man has to carve his block of steel with cold chisel and file—after that everyone finds the job pretty easy. A metal plane does it quickly and easily.

THE EDITOR.



HOME OF THE GODS

***Politics,** in the development of a culture, always comes before science—but sometimes science can twist politics into new shapes.*

Illustrated by Bernbach

—BY A. E. van VOGT

At first the land below was a shadow seen through mist. As the three spaceships of Lord Clane Linn's expedition settled through the two thousand mile atmosphere, the vagueness went out of the scene. Mountains looking like maps rather than territories took form. The vast sea to the north sank beyond the far horizon of swamps and marshes, hills and forests. The reality grew wilder and wilder, but the pit was directly ahead now, an enormous black hole on a long narrow plain.

The ships settled to the ground on a green meadow half a mile from the nearest edge of the pit, which lay to the northeast. Some six hundred men and women, three hundred of them slaves, emerged from the vessels, and a vast amount of equipment was unloaded. By nightfall habitations had been erected for Clane and the three slave women who attended him, for two knights and for three temple scientists and five scholars not connected with a religious organization. In addition a corral had been built for the slaves, and the two companies of soldiers were encamped in a half circle around the main camp.

Sentries were posted, and the spaceships withdrew to a height of about five hundred feet. All night long, a score of fires, tended by

trusted slaves, brightened the darkness. Dawn came uneventfully, and slowly the camp took up the activities of a new day. Clane did not remain to direct it. Immediately after breakfast, horses were saddled; and he and twenty-five men, including a dozen armed soldiers, set out for the nearby home of the gods.

They were all rank unbelievers, but they had proceeded only a few hundred yards when Clane noticed that one of the riders was as pale as lead. He reined up beside him.

"Breakfast upset you?" he asked gently. "Better go back to camp and rest today."

Most of those who were destined to continue watched the lucky man trot off out of sight into the brush.

The evenness of the land began to break. Gashes opened in the earth at their feet, and ran off at a slant towards the pit, which was still not visible beyond the trees. Straight were those gashes, too straight, as if long ago irresistible objects had hurtled up out of the pit each at a different angle, each tearing the intervening earth as it darted up out of the hell below.

Clane had a theory about the pits. Atomic warfare by an immeasurably superior civilization. Atomic bombs that set up a reaction in the ground where they landed, and only gradually wore themselves out in the resisting soil, concrete and steel of vast cities. For centuries the remnants roiled and flared with deadly activity. How long? No one knew. He had an idea that if star maps of the period could be located an estimate of the time gap might be possible. The period involved must be very great, for several men that he knew had visited pits on Earth without ill effects.

The god fires were dying down. It was time for intellectually bold men to begin exploring. Those who came first would find the treasures. Most of the pits on Earth were absolutely barren affairs overgrown with weeds and brush. A few showed structures in their depths, half buried buildings, tattered walls, mysterious caverns. Into these a handful of men had ventured—and brought back odd mechanical creations, some obviously wrecks, a few that actually worked, all tantalizing in their suggestion of a science marvelous beyond anything known to the temple scholars.

It was this pit on Venus, which they were now approaching, that had always excited the imagination of the adventurers. For years visitors had crouched behind lead or concrete barriers and peered with periscopes into the fantastic depths below. The nameless city that had been there must have been built into the bowels of the earth. For the bottom was a mass of concrete embankments, honeycombed with black holes that seemed to lead down into remoter depths.

Clane's reverie died down. A soldier in front of him let out a shout, reined in his horse and pointed ahead. Clane urged his horse up to the rise on top of which

the man had halted. And reined in *his* horse.

He was looking down a gently sloping grassy embankment. It ran along for about a hundred feet. And then there was a low concrete fence.

Beyond was the pit.

At first they were careful. They used the shelter of the fence as a barrier to any radiation that might be coming up from below. Clane was the exception. From the beginning he stood upright, and peered downward through his glasses into the vista of distance below. Slowly, the others lost their caution, and finally all except two artists were standing boldly on their feet gazing into the most famous home of the gods.

It was not a clear morning. A faint mist crawled along hiding most of the bottom of the pit. But it was possible, with the aid of the glasses, to make out contours, and to see the far precipice nearly seven miles away.

About midmorning, the mists cleared noticeably, and the great sun of Venus shone down into the hole, picking out every detail not hidden by distance. The artists, who had already sketched the main outlines, settled down to work in earnest. They had been selected for their ability to draw maps, and the watchful Clane saw that they were doing a good job. His own patience, product of his isolated upbringing, was even greater than theirs. All through that day he examined the bottom of the pit with his glasses, and compared the reality with the developing drawings on the drawing boards.

By late afternoon, the job was complete. And the results satisfied every hope he had had. There were no less than three routes for getting out of the pit on foot in case of an emergency. And every tree and cave opening below was clearly marked in its relation to other trees and openings. Lines of shrubs were sketched in, and each map was drawn to scale.

That night, too, passed without incident. The following morning Clane signaled one of the spaceships to come down, and, shortly after breakfast, the two temple scientists, one knight, three artists, a dozen soldiers, a crew of fifteen and himself climbed aboard. The ship floated lightly clear of the ground. And, a few minutes later, nosed over the edge of the pit, and headed downward.

They made no attempt to land, but simply cruised around searching for radioactive areas. Round and round at a height that varied between five hundred feet and a daring two hundred feet. It was daring. The spaceship was their sole instrument for detecting the presence of atomic energy. Long ago, it had been discovered that when a spaceship passed directly above another spaceship, the one that was on top suffered a severe curtailment of its motive power. Immediately it would start to fall.

In the case of spaceships, the two ships would usually be moving along so swiftly that they would be

past each other almost immediately. Quickly, then, the disabled ship would right itself and proceed on its way.

Several attempts had been made by military scientists to utilize the method to bring down enemy spaceships. The attempts, however, were strictly limited by the fact that a ship which remained five hundred feet above the source of energy endured so slight a hindrance that it didn't matter.

Nine times their ship made the telltale dip, and then, for as long as was necessary they would cruise over and over the area trying to define its limits, locating it on their maps, marking off first the danger zone, then the twilight zone and finally the safety zone. The final measure was the weakness or strength of the impulse.

The day ended, with that phase of their work still uncompleted. And it was not until noon the next day that the details were finally finished. Since it was too late to make a landing, they returned to camp and spent the afternoon sleeping off their accumulated fatigue.

It was decided that the first landing would be made by one hundred men, and that they would take with them supplies for two weeks. The site of the landing was selected by Clane after consultation with the knights and the scientists. From the air it looked like a large concrete structure with roof and walls still intact, but its main feature was that it was located near one of the routes by which the people on foot could leave the pit. And it was surrounded by more than a score of cavelike openings.

His first impression was of intense silence. Then he stepped out of the ship onto the floor of the pit. And there was a kind of pleasure in listening to the scrambling sounds of the men who followed him. The morning air quickly echoed to the uproar of a hundred men breathing, walking, moving—and unloading supplies.

Less than an hour after he first set foot into the soft soil of the pit, Clane watched the spaceship lift from the ground, and climb rapidly up about five hundred feet. At that safety height it leveled off, and began its watchful cruise back and forth above the explorers.

Once again no hasty moves were made. Tents were set up and a rough defense marked off. The food was sealed off behind a pile of concrete. Shortly before noon, after an early lunch, Clane, one knight, one temple scientist and six soldiers left the encampment and walked towards the "building" which, among other things, had drawn them to the area.

Seen from this near vantage point it was not a building at all, but an upjutment of concrete and metal, a remnant of what had once been a man-made burrow into the depths of the earth, a monument to the futility of seeking safety by mechanical rather than intellectual and moral means. The sight of it depressed Clane. For a millennium it had stood here, first in a seething ocean of unsettled energy, and now amid a great

silence it waited for the return of man.

He paused to examine the door, then motioned two soldiers to push at it. They were unable to budge it, and so, waving them aside, he edged gingerly past the rusted door jamb. And was inside.

He found himself in a narrow hallway, which ran along for about eight feet, and then there was another door. A closed door this time. The floor was concrete, the walls and ceiling concrete, but the door ahead was metal. Clane and the knight, a big man with black eyes, shoved it open with scarcely an effort, though it creaked rustily as they did.

They stood there, startled. The interior was not dark as they had expected, but dimly lighted. The luminous glow came from a series of small bulbs in the ceiling. The bulbs were not transparent, but coated with an opaque coppery substance. The light shone through the coating.

Nothing like it had ever been seen in Linn or elsewhere. After a blank period, Clane wondered if the lights had turned on when they opened the door. They discussed it briefly, then shut the door. Nothing happened. They opened the door again, but the lights did not even flicker.

They had obviously been burning for centuries.

With a genuine effort, he suppressed the impulse to have the treasures taken down immediately and taken to the camp. The deathly silence, the air of immense antiquity brought the sane realization that there was no necessity to act swiftly here. He was first on this scene.

Very slowly, almost reluctantly, he turned his attention from the ceiling to the room itself. A wrecked table stood in one corner. In front of it stood a chair with one leg broken and a single strand of wood where the seat had been. In the adjoining corner was a pile of rubble, including a skull and some vaguely recognizable ribs which merged into a powdery skeleton. The relict of what had once been a human being lay on top of a rather long, all-metal rod. There was nothing else in the room.

Clane strode forward, and eased the rod from under the skeleton. The movement, slight though it was, was too much for the bone structure. The skull and the ribs dissolved into powder, and a faint white mist hovered for a moment, then settled to the floor.

He stepped back gingerly, and, still holding the weapon, passed through the door, and along the narrow hallway, and so out into the open.

The outside scene was different. He had been gone from it fifteen minutes at most, but in that interval a change had taken place. The spaceship that had brought them was still cruising around overhead. But a second spaceship was in the act of settling down beside the camp.

It squashed down with a crackling of brush and an "harumph!" sound of air squeezing out from the indentation it made in the ground. The door opened, and, as Clane headed for the camp, three men emerged

from it. One wore the uniform of an aid-de-camp to supreme headquarters, and it was he who handed Clane a dispatch pouch.

The pouch contained a single letter from his elder brother. Lord Jerrin, commander-in-chief of Linnan armies on Venus. In the will of the late Lord Leader, Jerrin had been designated to become co-ruler with Tews when he attained the age of thirty, his sphere of administration to be the planets. His powers in Linn were to be strictly secondary to those of Tews. His letter was curt:

Honorable brother:

It has come to my attention that you have arrived on Venus. I need hardly point out to you that the presence of a mutation here at this critical period of the war againtst the rebels is bound to have an adverse effect. I have been told that your request for this trip was personally granted by the Lord Adviser Tews. If you are not aware of the intricate motives that might inspire Tews to grant such permission, then you are not alert to the possible disasters that might befall our branch of the family. It is my wish and command that you return to Earth at once.

As Clane looked up from the letter, he saw that the commander of the spaceship which had brought the messenger, was silently signaling to him. He walked over and drew the captain aside.

"I didn't want to worry you," the man said, "but perhaps I had better inform you that this morning, shortly after your expedition entered the pit, we saw a very large body of men riding along several miles to the northeast of the pit. They have shown no inclination to move in this direction, but they scattered when we swooped over them, which means that they are Venusian rebels."

Clane stood frowning for a moment, then nodded his acceptance of the information. He turned away, into his spacious tent, to write an answer to his brother that would hold off the crisis between *them* until the greater crisis that had brought him to Venus shattered Jerrin's disapproval of his presence.

That crisis was due to break over Jerrin's still unsuspecting head in just about one week.

In high government and military circles in Linn and on Venus, the succession of battles with the Venusian tribesmen of the three central islands were called by their proper name: war! For propaganda purposes, the word, rebellion, was paraded at every opportunity. It was a necessary illusion. The enemy fought with the ferocity of a people who had tasted slavery. To rouse the soldiery to an equal pitch of anger and hatred there was nothing that quite matched the term, rebel.

Men who had faced hideous dangers in the swamps and marshes could scarcely restrain themselves at the thought that traitors to the empire were causing all the trouble. Lord Jerrin, an eminently fair man, who admired a bold and resourceful opponent, for once made no attempt to discourage the false impression. He recognied that the Linnans were the oppressors, and at times it made him physically ill that so many men must die to enforce a continued sub-

jection. But he recognized, too, that there was no alternative.

The Venusians were the second most dangerous race in the solar system, second only to the Linnans. The two peoples had fought each other for three hundred and fifty years, and it was not until the armies of Raheinl had landed on Uxta, the main island of Venus some sixty years before that a victory of any proportions was scored. The young military genius was only eighteen at the time of the battle of the Casuna marsh. Swift conquest of two other islands followed, but then his dazzled followers in Linn provoked the civil war that finally ended after nearly eight years in the execution of Raheinl by the Lord Leader. The latter proceeded with a cold ferocity to capture four more island strongholds of the Venusians. In each one he set up a separate government, revived old languages, suppressed the common language—and so strove to make the islanders think of themselves as separate peoples.

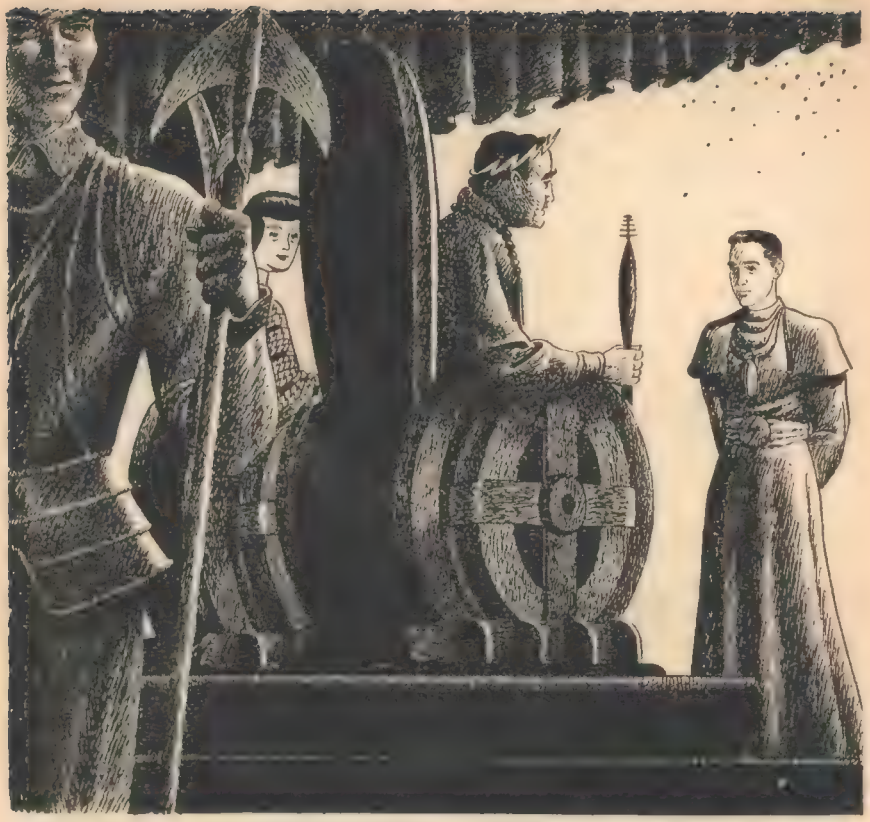
For years they seemed to — and then, abruptly, in one organized uprising they seized the main cities of the five main islands. And discovered that the Lord Leader had been more astute than they imagined.

The military strongholds were not in the cities, as they had assumed, and as their spies had reported. The centers of Linnan power were located in an immense series of small forts located in the marshes. These forts had always seemed weak outposts, designed to discourage raiders rather than rebellions. And no Venusian had ever bothered to count the number of them. The showy city forts, which were elaborately attacked turned out to be virtual hollow shells. By the time the Venusians rallied to attack the forts in the marshes it was too late for the surprise to be effective. Reinforcements were on the way from Earth. What had been planned as an all-conquering coup became a drawn-out war. And long ago, the awful empty feeling had come to the Venusians that they couldn't win. Month after month the vise of steel weapons, backed by fleets of spaceships and smaller craft tightened noticeably around the ever narrowing areas which they controlled. Food was becoming more scarce, and a poor crop year was in prospect. The men were grim and tense, the women cried a great deal and made much of their children, who had caught the emotional overtones of the atmosphere of fear.

Terror bred cruelty. Captive Linnans were hanged from posts, their feet dangling only a few inches from the ground. The distorted dead faces of the victims glared at the distorted hate-filled faces of their murderers.

The living knew that each account would be paid in rape and death. They were exacting their own payments in advance.

The situation was actually much more involved than it appeared. Some six months before, the prospect of an imminent triumph for Jerrin had penetrated to the Lord Adviser Tews. He pondered the situation with a painful understanding of how the emotions of the crowd



might be seduced by so momentous a victory. After considerable thought he resurrected a request Jerrin had made more than a year before for reinforcements. At the time Tews had considered it expedient to hasten the Venusian war to a quick end, but second thought brought an idea. With a pomp of public concern for Jerrin he presented the request to the patronate and added his urgent recommendations that at least three legions be assembled to assist "our hardpressed forces against a skillful and cunning enemy."

He could have added, but didn't, that he intended to deliver the reinforcements and so participate in the victory. The patronate would not dare to refuse to vote him a triumph co-equal with that already being planned for Jerrin. He discussed his projected trip with his mother, the Lady Lydia, and, in accordance with her political agreement with Clane, she duly passed the information on to the mutation.

Lydia had no sense of betraying her son. She had no such intention. But she knew that the fact that Tews

was going to Venus would soon be common knowledge, and so, sardonically, she reported to Clane less than two weeks before Tews was due to leave.

His reaction startled her. The very next day he requested an audience with Tews. And the latter, who had adopted an affable manner with the late Lord Leader's grandchildren, did not think of refusing Clane's request for permission to organize an expedition for Venus.

He was surprised when the expedition departed within one week of the request, but he thought that over too, and found it good.

The presence of Clane on Venus would embarrass Jerrin. The birth of a mutation twenty-five years before into the ruling family of Linn had caused a sensation. His existence had dimmed the superstitions about such semihumans, but the fears of the ignorant were merely confused. Under the proper circumstances people would still stone them —and soldiers would become panicky at the thought of the bad luck that struck an army, the rank and file of which saw a mutation just before a battle.

He explained his thoughts to Lydia, adding, "It will give me a chance to discover whether Jerrin was implicated in any way in the three plots against me that I have put down in the past year. And if he was, I can make use of the presence of Clane."

Lydia said nothing, but the falseness of the logic disturbed her. She, too, had once planned against Clane. For months now, she had questioned the blind impulse of mother love that had made her slave and conspire to bring Tews to power. Under Tews, the government creaked along indecisively while he writhed and twisted in a curious and ungraceful parody of modest pretense at establishing a more liberal government. His plans of transition were too vague. An old tactician herself, it seemed to her that she could recognize a developing hypocrite when she saw one.

"He's beginning to savor the sweetness of power," she thought, "and he realizes he's talked too much."

The possibilities made her uneasy. It was natural for a politician to fool others, but there was something ugly and dangerous about a politician who fooled himself. Fortunately, little that was dangerous could happen on Venus. Her own investigations had convinced her that the conspiracies against Tews had involved no important families, and besides Jerrin was not a man who would force political issues. He would be irritated by the arrival of Tews. He would see exactly what Tews wanted, but he would do nothing about it.

After the departure of Tews and his three legions, she settled herself to the routine tasks of governing for him. She had a number of ideas for re-establishing firmer control over the patronate, and there were about a hundred people whom she had wanted to kill for quite a long while.

During the entire period of the crisis on Venus, life in Linn went on with absolute normalcy.

Tews took up his quarters in the palace of the long-dead Venusian emperor, Heerkel, across town from the military headquarters of Jerrin. It was an error of the kind that startles and starts history. The endless parade of generals and other officers that streamed in and out of Mered passed him by. A few astute individuals made a point of taking the long journey across the city, but even some of those were in obvious haste, and could scarcely tolerate the slow ceremoniousness of an interview with their ruler.

A great war was being fought. Officers in from the front lines took it for granted that their attitude would be understood. They felt remote from the peaceful pomp of Linn itself. Only the men who had occasion to make trips to Earth comprehended the vast indifference of the populations to the war on Venus. To the people at home it was a faraway frontier affair. Such engagements had been fought continuously from the time of their childhood, only every once in a while the scene changed.

His virtual isolation sharpened the suspicions with which Tews had landed. And frightened him. He hadn't realized how widespread was the disaffection. The plot must be well advanced, so advanced that thousands of officers knew about it, and were taking no chances on being caught with the man who, they must have decided, would be the loser. They probably looked around them at the enormous armies under the command of Jerrin. And knew that no one could defeat the man who had achieved the loyalty of so many legions of superb soldiers.

Swift, decisive action, it seemed to Tews, was essential. When Jerrin paid him a formal visit a week after his arrival, he was startled at the cold way in which Tews rejected his request that the reinforcements be sent to the front for a final smashing drive against the marsh-bound armies of the Venusians.

"And what," said Tews, noting with satisfaction the other's discomfiture, "would you do should you gain the victory which you anticipate?"

The subject of the question, rather than the tone, encouraged the startled Jerrin. He had had many thoughts about the shape of the coming victory, and after a moment he decided that that was actually why Tews had come to Venus, to discuss the political aspects of conquest. The older man's manner he decided to attribute to Tews' assumption of power. This was the new leader's way of reacting to his high position.

Briefly, Jerrin outlined his ideas. Execution of certain leaders directly responsible for the policy of murdering prisoners, enslavement only of those men who had participated intimately in the carrying out of the executions. But all the rest to be allowed to live without molestation, and in fact to return to their homes in a normal fashion. At first each island would be administered as a separate colony, but even during the first phase the common language would be restored and free trade permitted among the islands. The sec-

ond phase, to begin in about five years, and widely publicized in advance, should be the establishment of responsible government on the separate islands, but those governments would be part of the empire, and would support the occupation troops. The third phase should start ten years after that, and would include the organization of one central all-Venusian administration for the islands, with a federal system of government. And this system, too, would have no troops of its own, and would be organized entirely within the framework of the empire.

Five years later, the fourth and final phase could begin. All families with a twenty year record of achievement and loyalty could apply for Linnan-Venusian citizenship, with all the privileges and opportunities for self-advancement that went with it.

"It is sometimes forgotten," said Jerrin, "that Linn began as a city state, which conquered neighboring cities, and held its power in them by a gradual extension of citizenship. There is no reason why this system should not be extended to the planets with equal success."

He finished, "All around us is proof that the system of absolute subjection employed during the past fifty years has been a complete failure. The time has come for new and more progressive statesmanship."

Tews almost stood up in his agitation, as he listened to the scheme. He could see the whole picture now. The late Lord Leader had in effect willed the planets to Jerrin; and this was Jerrin's plan for welding his inheritance into a powerful military stronghold, capable, if necessary, of conquering Linn itself.

Tews smiled a cold smile. *Not yet, Jerrin,* he thought. *I'm still absolute ruler, and for three years yet what I say is what will happen. Besides, your plan might interfere with my determination to re-establish the republic at an opportune moment. I'm pretty sure that you, with all your liberalistic talk, have no intention of restoring constitutional government. It is that ideal which must be maintained at all costs.*

Aloud, he said, "I will take your recommendations under advisement. But now, it is my wish that in future all promotions be channeled through me. Any commands that you issue to commanding officers in the field are to be sent here for my perusal, and I will send them on."

He finished with finality, "The reason for this is that I wish to familiarize myself with the present positions of all units and with the names of the men in charge of them. That is all. It has been a privilege to have had this conversation with you. Good day, sir."

Move number one was as drastic as that.

It was only the beginning. As the orders and documents began to arrive, Tews studied them with the assiduity of a clerk. His mind reveled in paper work, and the excitement of his purpose made every detail important and interesting.

He knew this Venusian war. For two years he had sat in a palace some hundred miles farther back,

and acted the role of commander-in-chief, now filled by Jerrin. His problem, therefore, did not include the necessity of learning the situation from the beginning. He had merely to familiarize himself with the developments during the past year and a half. And, while numerous, they were not insurmountable.

From the first day, he was able to accomplish his primary purpose: replacement of doubtful officers with one after another of the horde of sycophants he had brought with him from Linn. Tews felt an occasional twinge of shame at the device, but he justified it on the grounds of necessity. A man contending with conspiring generals must take recourse to devious means. The important thing was to make sure that the army was not used against himself, the Lord Adviser, the lawful heir of Linn, the only man whose ultimate purposes were not autocratic and selfish.

As a secondary precaution, he altered several of Jerrin's troop dispositions. These had to do with legions that Jerrin had brought with him from Mars, and which presumably might be especially loyal to him personally. It would be just as well if he didn't know their exact location during the next few critical weeks.

On the twelfth day he received from a spy the information he had been waiting. Jerrin, who had gone to the front on an inspection tour two days before was returning to Mered. Tews catually had only an hour's warning. He was still setting the stage for the anticipated interview when Jerrin was announced. Tews smiled at the assembled courtiers. He spoke in a loud voice:

"Inform his excellency that I am engaged at the moment but that if he will wait a little I shall be happy to receive him."

The remark, together with the knowing smile that went with it, started a flutter of sensation through the room. It was unfortunate that Jerrin had failed to wait for his message to be delivered, but was already halfway across the room. He did not pause until he was standing in front of Tews. The latter regarded him with an indolent insolence.

"Well, what is it?"

Jerrin said quietly, "It is my unpleasant duty, my Lord Adviser, to inform you that it will be necessary to evacuate all civilians from Mered without delay. As a result of rank carelessness on the part of certain front-line officers, the Venusians have achieved a breakthrough north of the city. There will be fighting in Mered before morning."

Some of the ladies, and not a few of the gentlemen who were present uttered alarmed noises, and there was a general movement towards exits. A bellow from Tews stopped the disgraceful stampede. He settled heavily back in his chair. He smiled a twisted smile.

"I hope," he said, "that the negligent officers have been properly punished."

"Thirty-seven of them," said Jerrin, "have been executed. Here is a list of their names, which you might examine at your leisure."

Tews sat up. "Executed!" He had

a sudden awful suspicion that Jerrin would not lightly have executed men who had long been under his command. With a jerk he tore the seal from the document, and raced his gaze down the column. Every name on it was that of one of his satellite-replacements of the past twelve days.

Very slowly, he raised his eyes, and stared at the younger man. Their gazes met and held. The flinty blue eyes of Tews glared with an awful rage. The steel gray eyes of Jerrin were remorseless with contempt and disgust.

"Your most gracious excellency," he said in a soft voice, "one of my Martian legions has been cut to pieces. The carefully built-up strategy and envelopment of the past year is wiped out. It is my opinion that the men responsible for that had better get off of Venus, and back to their pleasures in Linn — or what they have feared so foolishly will really transpire."

He realized immediately it was a wild statement. His words stiffened Tews. For a moment the big man's heavy face was a mask of tensed anger, then with a terrible effort he suppressed his fury. He straightened:

"In view of the seriousness of the situation," he said, "I will remain in Mered and take charge of the forces on this front until further notice. You will surrender your headquarters to my officers tomorrow morning."

"If your officers," said Jerrin, "come to my headquarters, they will be whipped into the streets. And that applies to *anyone* from this section of the city."

He turned and walked out of the room. He had not a clear idea in his head as to what he was going to do about the fantastic crisis that had arisen.

Clane spent those three weeks, when the Venusian front was collapsing, exploring a myriad of holes in the pit. And, although the threat from the wandering parties of Venusians did not materialize, he moved his entire party into the pit for safety's sake. Guards were posted at the three main routes leading down into the abyss, and two spaceships maintained a continuous vigil over the countryside around the pit, and over the pit itself.

None of the precautions was an absolute guarantee of safety, but they added up fairly well. Any attempt of a large body of troops to come down and attack the camp would be so involved an affair that there would be plenty of time to embark everyone in spaceships, and depart.

It was not the only thing in their favor. After sixty years under Linnan rule, and although they themselves worshiped a sea god called Submerne, the Venusians respected the Linnan atom gods. It was doubtful if they would risk divine displeasure by penetrating into one of the pit homes of the gods.

And so the six hundred people in the pit were cut off from the universe by barriers of the mind as well as by the sheer inaccessibility of the pit. Yet they were not isolated. Daily

one of the spaceships made the trip to Mered, and when it floated back into the depths of the pit Clane would go aboard and knock on door after door inside. Each time he would be cautiously admitted by a man or woman, and the two would hold a private conference. His spies never saw each other. They were always returned to Mered at dusk, and landed one by one in various parts of the city.

The spies were not all mercenaries. There were men in the highest walks of the empire who regarded the Linn mutation as the logical heir of the late Lord Leader. To them Tews was merely a stopgap who could be put out of the way at the proper time. Again and again such individuals, who belonged to other groups, had secretly turncoated after meeting Clane, and become valuable sources of information for him.

Clane knew his situation better than his well-wishers. However much he might impress intelligent people the fact was that a mutation could not become ruler of the empire. Long ago, accordingly, he had abandoned some early ambitions in that direction, retaining only two main political purposes:

He was alive and in a position of advantage because his family was one of the power groups in Linn. Thought he had no friends among his own kin, he was tolerated by them because of the blood relationship. It was to his interest that they remained in high position. In crises he must do everything possible to help them.

That was purpose number one. Purpose number two was to participate in some way in all the major political moves made in the Linnan empire, and it was rooted in an ambition that he could never hope to realize. He wanted to be a general. War in its practical aspects, as he had observed it from afar, seemed to him crude and unintelligent. From early childhood he had studied battle strategy and tactics with the intention of reducing the confusion to a point where battles could be won by little more than irresistible maneuver.

It was a pleasure to combine purposes number one and two.

He arrived in Mered on the day following the clash between Tews and Jerrin, and took up residence in a house which he had long ago thoughtfully reserved for himself and his retinue. He made the move as unobtrusively as possible, but he did not delude himself that his coming would be unremarked.

Other men, too, were diabolically clever. Other men maintained armies of spies, as he did. All plans that depended upon secrecy possessed the fatal flaw of fragility. And the fact that they sometimes succeeded merely proved that a given victim was not himself an able man. It was one of the pleasures of life to be able to make all the preparations necessary to an enterprise within the sight and hearing of one's opponent.

Without haste he set about making them.

When Tews was first informed of Clane's arrival in Mered, about an hour after the event, his interest was dim. More important — or so they

seemed — reports were arriving steadily from other sources about the troop dispositions Jerrin was making for the defense of the city. What puzzled Tews was that some of the information came from Jerrin in the form of copies of the orders he was sending out.

Was the man trying to re-establish relations by ignoring the fact that a break had taken place? It was an unexpected maneuver, and it could only mean that the crisis had come before Jerrin was ready. Tews smiled coldly as he arrived at that conclusion. His prompt action had thrown the opposition into confusion. It should not be difficult to seize Jerrin's headquarters the following morning with his three legions, and so end the mutiny.

By three o'clock Tews had sent out the necessary orders. At four, a very special spy of his, the impoverished son of a knight, reported that Clane had sent a messenger to Jerrin, requesting an interview that evening. Almost simultaneously other spies reported on the activity that was taking place at Clane's residence. Among other things several small round objects wrapped in canvas were brought from the spaceship into the house. More than a ton of finely ground copper dust was carried in sacks into a cement outhouse. And finally a cube of material of the type used to build temples was carefully lowered to the ground. It must have been hot as well as heavy, because the slaves who took it into the house used slings and leadlined asbestos gloves.

Tews pondered the facts, and the very meaninglessness of them alarmed him. He suddenly remembered vague stories he had heard about the mutation, stories to which he had hitherto paid no attention.

It was not a moment to take chances.

Ordering a guard of fifty men to attend him, he set out for Clane's Mered home.

His first sight of the place startled Tews. The spaceship which, according to his reports, had flown away, was back. Suspended from a thick cable attached to its lower beam was a large gondola of the type slung under spaceships when additional soldiers were to be transported swiftly. They were used in space to carry freight only.

Now, it lay on the ground, and slaves swarmed over it. Not until he was on the estate itself did Tews see what they were doing. Each man had a canvas bag of copper dust suspended around his neck, and some kind of liquid chemical was being used to work the copper dust into the semitransparent hull of the carrier.

Tews climbed out of his chair, a big, plump man with piercing blue eyes. He walked slowly around the gondola, and the longer he looked the more senseless was the proceeding.

And, oddly, nobody paid the slightest attention to him. There were guards around, but they seemed to have received no instructions about spectators. They lounged in various positions, smoking, exchanging coarse jests, and otherwise quite unaware that the Lord Adviser of Linn was in their midst.

Tews did not enlighten them. He was puzzled and undecided, as he walked slowly towards the house. Again, no effort was made to interfere with his passage. In the large inner hallway, several temple scientists were talking and laughing. They glanced at him curiously, but it did not seem to occur to them that he did not belong.

Tews said softly, "Is Lord Clane inside?"

One of the scientists half turned, then nodded over his shoulder, casually. "You'll find him in the den working on the benediction."

There were more scientists in the living room. Tews frowned inwardly as he saw them. He had come prepared for drastic action, if necessary. But it would be indiscreet to arrest Clane with so many temple scientists as witnesses. Besides, there were too many guards.

Not that he could imagine any reason for an arrest. This looked like a religious ceremony, being readied here.

He found Clane in the den, a medium sized room leading onto a patio.

Clane's back was to him, and he was bending intently over a cube of temple building material. Tews recognized it from the description his spies had given him as the "hot," heavy object that the sweating slaves had handled so carefully in transporting it from the spaceship.

On the table near the "cube" were six half balls of coppery substance.

Tews had not time to look at them closely, for Clane turned to see who had come in. He straightened with a smile.

"Your excellency," he said. He bowed. He came forward. "This is a pleasure."

Tews was disappointed. He had heard that the mutation could be surprised into a condition of extreme nervousness, as the result of his affliction. There was no nervousness. It was obvious that this pale, intense, fragile looking young man had overcome his childish weakness. Or else he was calm with the calmness of a clear conscience. Tews began to feel better. Whatever the explanation there seemed nothing dangerous here.

"I was passing by," he said, "and, having been informed of your presence in Mered, decided to, uh, drop in." He waved a hand. "What is all this? This gondola and such."

Clane bowed again, but his expression was grave when he straightened, his eyes sorrowful.

"As your excellency is aware," he said, "some ten thousand officers and men of the fourth Martian legion were captured by the Venusians. This morning the Venusians were observed to be erecting thousands of posts on which they intend to hang these brave, unfortunate men, without" — he suddenly sounded indignant — "without so much as a religious ceremony."

He went on quietly, "The gondola will be towed over to the scene of the hanging, and a benediction will be spoken over it from the spaceship at the moment that the men are dying." He sighed heavily. "It is unfortunately all that we can do."

He finished: "I am going tonight to ask my brother, Jerrin, for permission to perform this merciful act, since I am informed that nothing else can be."

All the vague fears that had troubled the Lord Adviser were gone as if they had never existed. He nodded sanctimoniously. "I am sure," he said, "that the noble Jerrin will grant your worthy request."

He hesitated, anxious now to leave; and yet— He looked around, conscious that he should take nothing for granted. He walked over to the table and stared frowningly down at the hollow half balls that lay there. They were very possibly the round objects that had been brought in from the spaceship wrapped in canvas. And now they had been cut in half, or opened. The balls were not completely empty. Each one contained a fragile appearing internal structure, which seemed to come to a focus in the center. But whatever had been supported by the spidery web of transparent stuff was not now visible.

Tews did not look very hard.

These were details for temple scientists.

Once more he turned away—and saw a metallic rod standing against the near wall. He walked over and picked it up. Its lightness startled him. It was, he estimated, about four feet long, and the thin end was startlingly bright, a jewel rather than a metallic brightness.

Tews turned to look questioningly at Clane. The young man came over.

"We are all hoping," he said, "that this rod, which we found in the pit of the gods, is the legendary rod of fire. According to the legend, a basic requirement was that the wielder be pure in heart, and that, if he was, the gods would at their own discretion, but under certain circumstances, activate the rod."

Tews nodded soberly, and put the thing back where he had found it.

"It is with pleasure," he said, "that I find you taking these interests in religious matters. I think it important that a member of our illustrious family should attain high rank in the temples, and I wish to make clear that no matter what happens" — he paused significantly — "*no matter what happens,* you may count me as your protector and friend."

He returned to Heerkel's palace, but, being a careful, thoughtful man, who knew all too well that other people were not always as pure in heart as they pretended, he left his spies to watch out for possible subversive activity.

He learned in due course that Clane had been invited for dinner by Jerrin, but had been received with that cold formality which had long distinguished the relationship between the two brothers. One of the slave waiters, bribed by a spy, reported that once, during the meal, Clane urged that a hundred spaceships be withdrawn from patrols and assigned to some task which was not clear to the slave.

There was something else about opening up the battle lines to the northeast, but this was so vague that the Lord Adviser did not think of it again until, shortly after midnight, he was roused from sleep by the desperate cries of men, and the clash of metal outside his bedroom.

Before he could more than sit up, the door burst open, and swarms of Venusian soldiers poured inside.

The battle lines to the northeast had been opened up.

It was the third night of his captivity, the hanging night. Tews quivered as the guards came for him about an hour after dusk, and led him out into the fire-lit darkness. He was to be first. As his body swung aloft, twenty thousand Venusians would tug on the ropes around the necks of ten thousand Linnan soldiers. The writhings and twistings that would follow were expected to last ten or more minutes.

The night upon which Tews gazed with glazed eyes was like nothing he had ever seen. Uncountably numerous fires burned on a vast plain. In the near distance he could see the great post upon which he was to be executed. The other posts began just beyond it. There were rows of them, and they had been set up less than five feet apart, with the rows ten

feet from each other, to make room for camp fires that lighted the scene.

The doomed men were already at their posts, tied hand and foot, the ropes around their necks. Tews could only see the first row with any clearness. They were all officers, that first line of victims; and they stood at ease almost to a man. Some were chatting with those near them, as Tews was led up, but the conversation stopped as they saw him.

Never in his life had Tews seen such consternation flare into so many faces at once. There were cries of horror, groans of incredulous despair.

Tews did not expect to be recognized, but it was possible the men had been taunted with his identity. Their eyes were curious, but his three-day beard and the night with its flickering fire shadows gave them little opportunity to be sure.

No one said anything as he mounted the scaffold. Tews himself stood stiff and pale as the rope was fitted around his neck. He had ordered many a man to be hanged in his time. It was a different and thrilling sensation to be the victim not the judge.

The passion of anger that came was rooted in a comprehension that had been gathering in his brain for three days: the comprehension that he wouldn't be where he was if he had actually believed that a resurrection was in progress. Instead, he had *counted* on Jerrin maintaining his forces against the enemy, while his three legions seized control from Jerrin.

Deep down inside, he had believed in Jerrin's honesty.

He had sought to humiliate Jerrin, so that he could nullify the rightful honors of a young man with whom he did not wish to share the power of the state.

His desperate fury grew out of the consciousness — too late — that Jerrin had in reality been plotting against him.

That chaos of thought would have raged on but for one thing: At that moment he happened to glance down, and there, below the platform, with a group of Venusian leaders, stood Clane.

The shock was too great to take all in one mental jump. Tews glared down at the slim young man, and the picture was absolutely clear now. There had been a treasonable deal between Jerrin and the Venusians.

He saw that the mutation was in his temple scientist fatigue gown, and that he carried the four foot metal "rod of fire." That brought a memory. He had forgotten all about the benediction in the sky. He looked up, but the blackness was unrelieved. If the ship and the gondola were up there they were part of the night, invisible and unattainable.

His feverish gaze flashed down again at the mutation. He braced himself, but before he could speak, Clane said:

"Your excellency, let us waste no time with recriminations. Your death would renew the civil war in Linn. That is the last thing we desire, as we shall prove tonight, beyond all your suspicions."

Tews had hold of himself suddenly. With a flare of logic, he examined the chances of a rescue. There was none. If spaceships should try to land troops, the Venusians need merely pull on their ropes, and hang the bound men—and then turn their vast, assembled army to hold off the scattered attacks launched from scores of spaceships. That was one maneuver they had undoubtedly prepared against; and since it was the only possible hope, and *it* couldn't take place, then Clane's words were a meaningless fraud.

He forgot that, for the Venusian emperor, a grim-faced man of fifty or so was climbing the platform steps. He stood there for minutes while silence gradually fell on the enormous crowds. Then he stepped to the front group of megaphones and spoke in the common language of Venus:

"Fellow Venusians, on this night of our vengeance for all the crimes that have been committed against us by the empire of Linn, we have with us an agent of the commanding general of our vile enemy. He has come to us with an offer, and I want him to come up here and tell it to you, so that you can laugh in his face as I did."

There was a mass shriek from the darkness: "Hang him! Hang him, too!"

Tews was chilled by that fierce cry, but he was forced to admire the cunning of the Venusian leader. Here was a man whose followers must many times have doubted his wisdom in fighting the war to a finish. His face, even in those shadows, showed the savage lines of obstinacy, of a badly worried general, who knew what criticism could be. What an opportunity this was for gaining public support.

Clane was climbing the steps. He waited until silence once more was restored, and then said in a surprisingly strong voice:

"The atom gods of Linn, whose agent I am, are weary of this war. I call upon them to end it NOW!"

The Venusian emperor started towards him. "That isn't what you were going to say," he cried. "You—"

He stopped. Because the sun came out.

The sun came out. Several hours had passed, since it had sunk behind the flaming horizon of the northern sea. Now, in one leap it had jumped to the sky directly overhead.

The scene of so many imminent deaths stood out as in the brightness of noon. All the posts with their victims still standing beneath them, the hundreds of thousands of Venusian spectators, the great plain with the now visible coastal city in the distance—were brilliantly lighted.

The shadows began on the other side of the plain. They city could only be seen by vague light reflections. The sea beyond to the north and the mountains to the south were as deep as ever in blackness.

Seeing that darkness, Tews realized that it was not the sun at all above, but an incredible ball of fire, a source of light that, in this cubic mile of space equaled the sun in magnitude of light.

The gods of Linn had answered the call made to them.

His realization ended. There was a cry from scores of thousands of throats, a cry stranger and more horrible than any sound that Tews had ever heard. There was fear in it, and despair, and an awful reverence. Men and women alike started to sink to their knees.

At that moment the extent of the defeat that was here penetrated to the Venusian leader. He let out a terrible cry of his own—and leaped towards the catch that would release the trapdoor on which Tews stood. From the corner of one eye, Tews saw Clane bring up the rod of fire.

There was no fire, but the emperor dissolved. Tews could never afterwards decide what actually happened, yet he had a persistent memory of a human being literally turning into liquid stuff. Liquid that collapsed onto the platform, and burned a hole through the wood. The picture was so impossible that he closed his eyes, and never again quite admitted the reality to himself.

When he opened his eyes again, spaceships were coming down from the sky. To the now prostrate Venusians, the sudden appearance of fifty thousand Linnan soldiers among them must have seemed like a miracle as great as the two they had already witnessed.

An entire reserve army was captured that night, and, though the war on other islands dragged on and on, the great island of Uxta was completely captured within a few weeks.

Clane's words had been proved beyond all suspicions.

On a cloudy afternoon a week later, Clane was among the distinguished Linnans who attended the departure of the flotilla of ships, which was to accompany the Lord Adviser Tews back to Earth.

Tews and his retinue arrived, and as he came up to the platform, a group of temple Initiates burst into a paroxysm of singing. The Lord Adviser stopped, and stood for a minute, a faint smile on his face, listening.

The return to Earth, quietly suggested by Clane, suited him completely. He would take with him the first tidings of the Venusian victory. He would have time to scotch any rumors that the Lord Adviser himself had been humiliatingly captured. And, above all, he would be the one who would insist upon full triumph honors for Jerrin.

He was amazed that he had temporarily forgotten his old cunnings about things like that. As he climbed aboard the flagship, the Initiates broke into a new spasm of sound.

It was clear that the atom gods, too, were satisfied.

THE END.

CONCERNING E AND A

Inasmuch as the editorial staff of Astounding Science Fiction is, of course, incapable of error, the explanation must be that van Vogt has changed his name. Or else that the error was noticed after the cover had been printed and before these pages were set up.

THE EDITOR.

BY H. BEAM PIPER

Illustrated by Napoli

TIME AND TIME AGAIN

***To upset** the stable, mighty stream of time would probably take an enormous concentration of energy. And it's not to be expected that a man would get a second chance at life. But an atomic might accomplish both—*

Blinded by the bomb-flash and numbed by the narcotic injection, he could not estimate the extent of his injuries, but he knew that he was dying. Around him, in the darkness, voices sounded as through a thick wall.

"They mighta left mosta these Joes where they was. Half of them won't even last till the truck comes."

"No matter; so long as they're alive, they must be treated," another voice, crisp and cultivated, rebuked. "Better start taking names, while we're waiting."

"Yes, sir." Fingers fumbled at his identity badge. "Hartley, Allan; Captain, G5, Chem. Research AN/73/D. Serial, SO-23869403J."

"Allan Hartley!" The medic officer spoke in shocked surprise. "Why, he's the man who wrote 'Children of the Mist', 'Rose of Death', and 'Conqueror's Road'!"

He tried to speak, and must have stirred; the corpsman's voice sharpened.

"Major, I think he's part conscious. Mebbe I better give him 'nother shot."

"Yes, yes; by all means, sergeant."

Something jabbed Allan Hartley

in the back of the neck. Soft billows of oblivion closed in upon him, and all that remained to him was a tiny spark of awareness, glowing alone and lost in a great darkness.

The Spark grew brighter. He was more than a something that merely knew that it existed. He was a man, and he had a name, and a military rank, and memories. Memories of the searing blue-green flash, and of what he had been doing outside the shelter the moment before, and memories of the month-long siege, and of the retreat from the north, and memories of the days before the War, back to the time when he had been little Allan Hartley, a schoolboy, the son of a successful lawyer, in Williamsport, Pennsylvania.

His mother he could not remember; there was only a vague impression of the house full of people who had tried to comfort him for something he could not understand. But he remembered the old German woman who had kept house for his father, afterward, and he remembered his bedroom, with its chintz-covered chairs, and the warm-colored patch quilt on the old cherry bed, and the tan curtains at the windows, edged with dusky red, and the morning sun shining through them. He could almost see them, now.

He blinked. He *could* see them!

For a long time, he lay staring at them unbelievingly, and then he deliberately closed his eyes and counted ten seconds, and as he counted, terror gripped him. He was afraid to open them again, lest he find himself blind, or gazing at the filth and wreckage of a blasted city, but when he reached ten, he forced himself to look, and gave a sigh of relief. The sunlit curtains and the sun-gilded mist outside were still there.

He reached out to check one sense against another, feeling the rough monk's cloth and the edging of maroon silk thread. They were tangible as well as visible. Then he saw that the back of his hand was unscarred. There should have been a scar, souvenir of a rough-and-tumble brawl of his cub reporter days. He examined both hands closely. An instant later, he had sat up in bed and thrown off the covers, partially removing his pajamas and inspecting as much of his body as was visible.

It was the smooth body of a little boy.

That was ridiculous. He was a man of forty-three; an army officer, a chemist, once a best-selling novelist. He had been married, and divorced ten years ago. He looked again at his body. It was only twelve years old. Fourteen, at the very oldest. His eyes swept the room, wide with wonder. Every detail was familiar: the flower-splashed chair covers; the table that served as desk and catch-all for his possessions; the dresser, with its mirror stuck full of pictures of aircraft. It was the bedroom of his childhood home. He swung his legs over the edge of the bed. They were six inches too short to reach the floor.

For an instant, the room spun dizzily, and he was in the grip of utter panic, all confidence in the evidence of his senses lost. Was he insane?

Or delirious? Or had the bomb really killed him; was this what death was like? What was that thing, about "ye become as little children"? He started to laugh, and his juvenile larynx made giggling sounds. They seemed funny, too, and aggravated his mirth. For a little while, he was on the edge of hysteria and then, when he managed to control his laughter, he felt calmer. If he were dead, then he must be a discarnate entity, and would be able to penetrate matter. To his relief, he was unable to push his hand through the bed. So he was alive; he was also fully awake, and, he hoped, rational. He rose to his feet and prowled about the room, taking stock of its contents.

There was no calendar in sight, and he could find no newspapers or dated periodicals, but he knew that it was prior to July 18, 1946. On that day, his fourteenth birthday, his father had given him a light .22 rifle, and it had been hung on a pair of rustic forks on the wall. It was not there now, nor ever had been. On the table, he saw a boys' book of military aircraft, with a clean, new dustjacket; the flyleaf was inscribed: *To Allan Hartley, from his father, on his thirteenth birthday, 7/18 '45.* Glancing out the window at the foliage on the trees, he estimated the date at late July or early August, 1945; that would make him just thirteen.

His clothes were draped on a chair beside the bed. Stripping off his pajamas, he donned shorts, then sat down and picked up a pair of lemon-colored socks, which he regarded with disfavor. As he pulled one on, a church bell began to clang. St. Boniface, up on the hill, ringing for early Mass; so this was Sunday. He paused, the second sock in his hand.

There was no question that his present environment was actual. Yet, on the other hand, he possessed a set of memories completely at variance with it. Now, suppose, since his environment were not an illusion, everything else were? Suppose all these troublesome memories were no more than a dream? Why, he was just little Allan Hartley, safe in his room on a Sunday morning, badly scared by a nightmare! Too much science fiction, Allan; too many comic books!

That was a wonderfully comforting thought, and he hugged it to him contentedly. It lasted all the while he was buttoning up his shirt and pulling on his pants, but when he reached for his shoes, it evaporated. Ever since he had wakened, he realized, he had been occupied with thoughts utterly incomprehensible to any thirteen-year-old; even thinking in words that would have been so much Sanscrit to himself at thirteen. He shook his head regretfully. The just-a-dream hypothesis went by the deep six.

He picked up the second shoe and glared at it as though it were responsible for his predicament. He was going to have to be careful. An unexpected display of adult characteristics might give rise to some questions he would find hard to answer credibly. Fortunately, he was an only child; there would be no brothers or sisters to trip him up.

Old Mrs. Stauber, the housekeeper, wouldn't be much of a problem; even in his normal childhood, he had bulked like an intellectual giant in comparison to her. But his father—

Now, there the going would be tough. He knew that shrewd attorney's mind, whetted keen on a generation of lying and reluctant witnesses. Sooner or later, he would forget for an instant and betray himself. Then he smiled, remembering the books he had discovered, in his late 'teens, on his father's shelves and recalling the character of the openminded agnostic lawyer. If he could only avoid the inevitable unmasking until he had a plausible explanatory theory.

Blake Hartley was leaving the bathroom as Allan Hartley opened his door and stepped into the hall. The lawyer was bare-armed and in slippers; at forty-eight, there was only a faint powdering of gray in his dark hair, and not a gray thread in his clipped mustache. The old Merry Widower, himself, Allan thought, grinning as he remembered the white-haired but still vigorous man from whom he'd parted at the outbreak of the War.

"'Morning, Dad," he greeted.

"'Morning, son. You're up early. Going to Sunday school?"

Now there was the advantage of a father who'd cut his first intellectual tooth on Tom Paine and Bob Ingersoll; attendance at divine services was on a strictly voluntary basis.

"Why, I don't think so; I want to do some reading, this morning."

"That's always a good thing to do," Blake Hartley approved. "After breakfast, suppose you take a walk down to the station and get me a *Times*." He dug in his trouser pocket and came out with a half dollar. "Get anything you want for yourself, while you're at it."

Allan thanked his father and pocketed the coin.

"Mrs. Stauber'll still be at Mass,' he suggested. "Say I get the paper now; breakfast won't be ready till she gets here."

"Good idea." Blake Hartley nodded, pleased. "You'll have three-quarters of an hour, at least."

So far, he congratulated himself, everything had gone smoothly. Finishing his toilet, he went downstairs and onto the street, turning left at Brandon to Campbell, and left again in the direction of the station. Before he reached the underpass, a dozen half-forgotten memories had revived. Here was a house that would, in a few years, be gutted by fire. Here were four dwellings standing where he had last seen a five-story apartment building. A gasoline station and a weed-grown lot would shortly be replaced by a supermarket. The environs of the station itself were a complete puzzle to him, until he oriented himself.

He bought a New York *Times*, glancing first of all at the date line. Sunday, August 5, 1945; he'd estimated pretty closely. The battle

of Okinawa had been won. The Potsdam Conference had just ended. There were still pictures of the B-25 crash against the Empire State Building, a week ago Saturday. And Japan was still being pounded by bombs from the air and shells from off-shore naval guns. Why, tomorrow, Hiroshima was due for the Big Job! It amused him to reflect that he was probably the only person in Williamsport who knew that.

On the way home, a boy, sitting on the top step of a front porch, hailed him. Allan replied cordially, trying to remember who it was. Of course; Larry Morton! He and Allan had been buddies. They probably had been swimming, or playing Commandos and Germans, the afternoon before. Larry had gone to Cornell the same year that Allan had gone to Penn State; they had both graduated in 1954. Larry had gotten into some Government bureau, and then he had married a Pittsburgh girl, and had become twelfth vice-president of her father's firm. He had been killed, in 1968, in a plane crash.

"You gonna Sunday school?" Larry asked, mercifully unaware of the fate Allan foresaw for him.

"Why, no. I have some things I want to do at home." He'd have to watch himself. Larry would spot a difference quicker than any adult. "Heck with it," he added.

"Golly, I wisht I c'ld stay home from Sunday school whenever I wanted to," Larry envied. "How about us goin' swimmin', at the Canoe Club, 'safter?"

Allan thought fast. "Gee, I wisht I c'ld," he replied, lowering his grammatical sights. "I gotta stay home, 'safter. We're expectin' comp'ny; coupla aunts of mine. Dad wants me to stay home when they come."

That went over all right. Anybody knew that there was no rational accounting for the vagaries of the adult mind, and no appeal from adult demands. The prospect of company at the Hartley home would keep Larry away, that afternoon. He showed his disappointment.

"Aw, jeepers creepers!" he blasphemed euphemistically.

"Mebbe t'morrow," Allan said. "If I c'n make it. I gotta go, now; ain't had breakfast yet." He scuffed his feet boyishly, exchanged so-longs with his friend, and continued homeward.

As he had hoped, the Sunday paper kept his father occupied at breakfast, to the exclusion of any dangerous table talk. Blake Hartley was still deep in the financial section when Allan left the table and went to the library. There should be two books there to which he wanted badly to refer. For a while, he was afraid that his father had not acquired them prior to 1945, but he finally found them, and carried them onto the front porch, along with a pencil and a ruled yellow scratch pad. In his experienced future—or his past-to-

come—Allan Hartley had been accustomed to doing his thinking with a pencil. As reporter, as novelist plotting his work, as amateur chemist in his home laboratory, as scientific warfare research officer, his ideas had always been clarified by making notes. He pushed a chair to the table and built up the seat with cushions, wondering how soon he would become used to the proportional disparity between himself and the furniture. As he opened the books and took his pencil in his hand, there was one thing missing. If he could only smoke a pipe, now!

His father came out and stretched in a wicker chair with the *Times* book-review section. The morning hours passed. Allan Hartley leafed through one book and then the other. His pencil moved rapidly at times; at others, he doodled absently. There was no question, any more, in his mind, as to what or who he was. He was Allan Hartley, a man of forty-three, marooned in his own thirteen-year-old body, thirty years back in his own past. That was, of course, against all common sense, but he was easily able to ignore that objection. It had been made before: against the astronomy of Copernicus, and the geography of Columbus, and the biology of Darwin, and the industrial technology of Samuel Colt, and the military doctrines of Charles de Gaulle. Today's common sense had a habit of turning into tomorrow's utter nonsense. What he needed, right now, but bad, was a theory that would explain what had happened to him.

Understanding was beginning to dawn when Mrs. Stauber came out to announce midday dinner.

"I hope you von't mind haffin' it so early," she apologized. "Mein sister, Jennie, offer in Nippenose, she iss sick; I vant to go see her, dis afternoon, yet. I'll be back in blenty time to get supper, Mr. Hartley."

"Hey, Dad!" Allan spoke up. "Why can't we get our own supper, and have a picnic, like? That'd be fun, and Mrs. Stauber could stay as long as she wanted to."

His father looked at him. Such consideration for others was a most gratifying deviation from the juvenile norm; dawn of altruism, or something. He gave hearty assent.

"Why, of course, Mrs. Stauber. Allan and I can shift for ourselves, this evening; can't we, Allan? You needn't come back till tomorrow morning."

"*Ach,* t'ank you! T'ank you so mooch, Mr. Hartley."

At dinner, Allan got out from under the burden of conversation by questioning his father about the War and luring him into a lengthy dissertation on the difficulties of the forthcoming invasion of Japan. In view of what he remembered of the next twenty-four hours, Allan was secretly amused. His father was sure that the War would run on to mid-1946.

After dinner, they returned to the porch, Hartley *père* smoking a cigar and carrying out several law books. He only glanced at these

occasionally; for the most part, he sat and blew smoke rings, and watched them float away. Some thrice-guilty felon was about to be triumphantly acquitted by a weeping jury; Allan could recognize a courtroom masterpiece in the process of incubation.

It was several hours later that the crunch of feet on the walk caused father and son to look up simultaneously. The approaching visitor was a tall man in a rumpled black suit; he had knobby wrists and big, awkward hands; black hair flecked with gray, and a harsh, bigoted face. Allan remembered him. Frank Gutchall. Lived on Campbell Street; a religious fanatic, and some sort of lay preacher. Maybe he needed legal advice; Allan could vaguely remember some incident—

"Ah, good afternoon, Mr. Gutchall. Lovely day, isn't it?" Blake Hartley said.

Gutchall cleared his throat. "Mr. Hartley, I wonder if you could lend me a gun and some bullets," he began, embarrassedly. "My little dog's been hurt, and it's suffering something terrible. I want a gun, to put the poor thing out of its pain."

"Why, yes; of course. How would a 20-gauge shotgun do?" Blake Hartley asked. "You wouldn't want anything heavy."

Gutchall fidgeted. "Why, er, I was hoping you'd let me have a little gun." He held his hands about six inches apart. "A pistol, that I could put in my pocket. It wouldn't look right, to carry a hunting gun on the Lord's day; people wouldn't understand that it was for a work of mercy."

The lawyer nodded. In view of Gutchall's religious beliefs, the objection made sense.

"Well, I have a Colt .38-special," he said, "but you know, I belong to this Auxiliary Police outfit. If I were called out for duty, this evening, I'd need it. How soon could you bring it back?"

Something clicked in Allan Hartley's mind. He remembered, now, what that incident had been. He knew, too, what he had to do.

"Dad, aren't there some cartridges left for the Luger?" he asked.

Blake Hartley snapped his fingers. "By George, yes! I have a German automatic I can let you have, but I wish you'd bring it back as soon as possible. I'll get it for you."

Before he could rise, Allan was on his feet.

"Sit still, Dad; I'll get it. I know where the cartridges are." With that, he darted into the house and upstairs.

The Luger hung on the wall over his father's bed. Getting it down, he dismounted it, working with rapid precision. He used the blade of his pocketknife to unlock the endpiece of the breechblock, slipping out the firing pin and buttoning it into his shirt pocket. Then he reassembled the harmless pistol, and filled the clip with 9-millimeter cartridges from the bureau drawer.

There was an extension tele-

phone beside the bed. Finding Gutchall's address in the directory, he lifted the telephone, and stretched his handkerchief over the mouthpiece. Then he dialed Police Headquarters.

"This is Blake Hartley," he lied, deepening his voice and copying his father's tone. "Frank Gutchall, who lives at . . . take this down"—he gave Gutchall's address—"has just borrowed a pistol from me, ostensibly to shoot a dog. He has no dog. He intends shooting his

wife. Don't argue about how I know; there isn't time. Just take it for granted that I do. I disabled the pistol—took out the firing pin—but if he finds out what I did, he may get some other weapon. He's on his way home, but he's on foot. If you hurry, you may get a man there before he arrives, and grab him before he finds out the pistol won't shoot."

"O.K., Mr. Hartley. We'll take care of it. Thanks."

"And I wish you'd get my pistol back, as soon as you can. It's something I brought home from the other War, and I shouldn't like to lose it."

"We'll take care of that, too. Thank you, Mr. Hartley."

He hung up, and carried the Luger and the loaded clip down to the porch.

"Look, Mr. Gutchall; here's how it works," he said, showing it to the visitor. Then he slapped in the clip and yanked up on the toggle loading the chamber. "It's ready to shoot, now; this is the safety." He pushed it on. "When you're ready to shoot, just shove it forward and up, and then pull the trigger. You have to pull the trigger each time; it's loaded for eight shots. And be sure to put the safety back when you're through shooting."

"Did you load the chamber?" Blake Hartley demanded.

"Sure. It's on safe, now."

"Let me see." His father took the pistol, being careful to keep his finger out of the trigger guard, and looked at it. "Yes, that's all right." He repeated the instructions Allan had given, stressing the importance of putting the safety on after using. "Understand how it works, now?" he asked.

"Yes, I understand how it works. Thank you, Mr. Hartley. Thank you, too, young man."

Gutchall put the Luger in his hip pocket, made sure it wouldn't fall out, and took his departure.

"You shouldn't have loaded it," Hartley *père* reproved, when he was gone.

Allan sighed. This was it; the masquerade was over.

"I had to, to keep you from fooling with it," he said. "I didn't want you finding out that I'd taken out the firing pin."

"You what?"

"Gutchall didn't want that gun to shoot a dog. He has no dog. He meant to shoot his wife with it. He's a religious maniac; sees visions, hears voices, receives revelations, talks with the Holy Ghost. The Holy Ghost probably put him up to this caper. I'll submit that any man who holds long conversations with the Deity isn't to be trusted with a gun, and neither is any man who lies about why he wants one. And while I was at it, I called the police, on the upstairs phone. I had to use your name; I deepened my voice and talked through a handkerchief."

"You—" Blake Hartley jumped as though bee-stung. "Why did you have to do that?"

"You know why. I couldn't have

told them, 'This is little Allan Hartley, just thirteen years old; please, Mr. Policeman, go and arrest Frank Gutchall before he goes root-toot-toot at his wife with my pappa's Luger.' That would have gone over big, now, wouldn't it?"

"And suppose he really wants to shoot a dog; what sort of a mess will I be in?"

"No mess at all. If I'm wrong—which I'm not—I'll take the thump for it, myself. It'll pass for a dumb kid trick, and nothing'll be done. But if I'm right, you'll have to front for me. They'll keep your name out of it, but they'd give me a lot of cheap boy-hero publicity, which I don't want." He picked up his pencil again. "We should have the complete returns in about twenty minutes."

That was a ten-minute underestimate, and it was another quarter-hour before the detective-sergeant who returned the Luger had finished congratulating Blake Hartley and giving him the thanks of the Department. After he had gone, the lawyer picked up the Luger, withdrew the clip, and ejected the round in the chamber.

"Well," he told his son, "you were right. You saved that woman's life." He looked at the automatic, and then handed it across the table. "Now, let's see you put that firing pin back."

Allan Hartley dismantled the weapon, inserted the missing part, and put it together again, then snapped it experimentally and returned it to his father. Blake Hartley looked at it again, and laid it on the table.

"Now, son, suppose we have a little talk," he said softly.

"But I explained everything," Allan objected innocently.

"You did not," his father retorted. "Yesterday you'd never have thought of a trick like this; why, you wouldn't even have known how to take this pistol apart. And at dinner, I caught you using language and expressing ideas that were entirely outside anything you'd ever known before. Now, I want to know—and I mean this literally."

Allan chuckled. "I hope you're not toying with the rather medieval notion of obsession," he said.

Blake Hartley started. Something very like that must have been flitting through his mind. He opened his mouth to say something, then closed it abruptly.

"The trouble is, I'm not sure you aren't right," his son continued. "You say you find me—changed. When did you first notice a difference?"

"Last night, you were still my little boy. This morning—" Blake Hartley was talking more to himself than to Allan. "I don't know. You were unusually silent at breakfast. And come to think of it, there was something . . . something strange . . . about you when I saw you in the hall, upstairs. . . . Allan!" he burst out, vehemently. "What has happened to you?"

Allan Hartley felt a twinge of pain. What his father was going through was almost what he, himself, had endured, in the first few minutes after waking.

"I wish I could be sure, myself, Dad," he said. "You see, when I woke, this morning, I hadn't the least recollection of anything I'd done yesterday. August 4, 1945," that is," he specified. "I was positively convinced that I was a man of forty-three, and my last memory was of lying on a stretcher, injured by a bomb explosion. And I was equally convinced that this had happened in 1975."

"Huh?" His father straightened. "Did you say nineteen *seventy*-five?" He thought for a moment. "That's right; in 1975, you will be forty-three. A bomb, you say?"

Allan nodded. "During the siege of Buffalo, in the Third World War," he said, "I was a captain in G5—Scientific Warfare, General Staff. There'd been a transpolar air invasion of Canada, and I'd been sent to the front to check on service failures of a new lubricating oil for combat equipment. A week after I got there, Ottawa fell, and the retreat started. We made a stand at Buffalo, and that was where I copped it. I remember being picked up, and getting a narcotic injection. The next thing I knew, I was in bed, upstairs, and it was 1945 again, and I was back in my own little thirteen-year-old body."

"Oh, Allan, you just had a nightmare to end nightmares!" his father assured him, laughing a trifle too heartily. "That's all!"

"That was one of the first things I thought of. I had to reject it; it just wouldn't fit the facts. Look; a normal dream is part of the dreamer's own physical brain, isn't it? Well, here is a part about two thousand per cent greater than the whole from which it was taken. Which is absurd."

"You mean all this Battle of Buffalo stuff? That's easy. All the radio commentators have been harping on the horrors of World War III, and you couldn't have avoided hearing some of it. You just have an undigested chunk of H. V. Kaltenborn raising hell in your subconscious."

"It wasn't just World War III; it was everything. My four years at high school, and my four years at Penn State, and my seven years as a reporter on the Philadelphia *Record*. And my novels: *'Children of the Mist,' 'Rose of Death,' 'Conqueror's Road.'* They were no kid stuff. Why, yesterday I'd never even have thought of some of the ideas I used in my detective stories, that I published under a *nom-de-plume*. And my hobby, chemistry; I was pretty good at that. Patented a couple of processes that made me as much money as my writing. You think a thirteen-year-old just dreamed all that up? Or, here; you speak French, don't you?" He switched languages and spoke at some length in good conversational slang-spiced Parisian. "Too bad you don't speak Spanish, too," he added,

reverting to English. "Except for a Mexican accent you could cut with a machete, I'm even better there than in French. And I know some German, and a little Russian."

Blake Hartley was staring at his son, stunned. It was some time before he could make himself speak.

"I could barely keep up with you, in French," he admitted. "I can swear that in the last thirteen years of your life, you had absolutely no chance to learn it. All right; you lived till 1975, you say. Then, all of a sudden, you found yourself back here, thirteen years old, in 1945. I suppose you remember everything in between?" he asked. "Did you ever read James Branch Cabell? Remember Florian de Puysange, in 'The High Place'?"

"Yes. You find the same idea in 'Jurgen' too," Allan said. "You know, I'm beginning to wonder if Cabell mightn't have known something he didn't want to write."

"But it's impossible!" Blake Hartley hit the table with his hand, so hard that the heavy pistol bounced. The loose round he had ejected from the chamber toppled over and started to roll, falling off the edge. He stooped and pick it up. "How can you go back, against time? And the time you claim you came from doesn't exist, now; it hasn't happened yet." He reached for the pistol magazine, to insert the cartridge, and as he did, he saw the books in front of his son. "Dunne's 'Experiment with Time,'" he commented. "And J. N. M. Tyrrell's 'Science and Psychical Phenomena.' Are you trying to work out a theory?"

"Yes." It encouraged Allan to see that his father had unconsciously adopted an adult-to-adult manner. "I think I'm getting somewhere, too. You've read these books? Well, look, Dad; what's your attitude on precognition? The ability of the human mind to exhibit real knowledge, apart from logical inference, of future events? You think Dunne is telling the truth about his experiences? Or that the cases in Tyrrell's book are properly verified, and can't be explained away on the basis of chance?"

Blake Hartley frowned. "I don't know," he confessed. "The evidence is the sort that any court in the world would accept, if it concerned ordinary, normal events. Especially the cases investigated by the Society for Psychical Research: they *have* been verified. But how can anybody know of something that hasn't happened yet? If it hasn't happened yet, it doesn't exist, and you can't have real knowledge of something that has no real existence."

"Tyrrell discusses that dilemma, and doesn't dispose of it. I think I can. If somebody has real knowledge of the future, then the future must be available to the present mind. And if any moment other than the bare present exists, then all time must be totally present; every moment must be perpetually coexistent with every other moment," Allan said.

"Yes. I think I see what you mean. That was Dunne's idea, wasn't it?"

"No. Dunne postulated an infinite series of time dimensions, the entire extent of each being the bare present moment of the next. What I'm postulating is the perpetual coexistence of every moment of time in this dimension, just as every graduation on a yardstick exists equally with every other graduation, but each at a different point in space."

"Well, as far as duration and sequence go, that's all right," the father agreed. "But how about the 'Passage of Time'?

"Well, time *does* appear to pass. So does the landscape you see from a moving car window. I'll suggest that both are illusions of the same kind. We imagine time to be dynamic, because we've never viewed it from a fixed point, but if it is totally present, then it must be static, and in that case, we're moving through time."

"That seems all right. But what's your car window?"

"If all time is totally present, then you must exist simultaneously at every moment along your individual life span," Allan said. "Your physical body, and your mind, and all the thoughts contained in your mind, each at its appropriate moment in sequence. But what is it that exists only at the bare moment we think of as *now*?"

Blake Hartley grinned. Already, he was accepting his small son as an intellectual equal.

"Please, teacher; what?"

"Your consciousness. And don't say, 'What's that?' Teacher doesn't know. But we're only conscious of one moment; the illusory *now*. This is 'now,' and it was 'now' when you asked that question, and it'll be 'now' when I stop talking, but each is a different moment. We imagine that all those nows are rushing past us. Really, they're standing still, and our consciousness is whizzing past them."

His father thought that over for some time. Then he sat up. "Hey!" he cried, suddenly. "If some part of our ego is time-free and passes from moment to moment, it must be extraphysical, because the physical body exists at every moment through which the consciousness passes. And if it's extraphysical, there's no reason whatever for assuming that it passes out of existence when it reaches the moment of the death of the body. Why, there's logical evidence for survival, independent of any alleged spirit-communication! You can toss out Patience Worth, and Mrs. Osborne Leonard's Feda, and Sir Oliver Lodge's son, and Wilfred Brandon, and all the other spirit-communicators, and you still have evidence."

"I hadn't thought of that," Allan confessed. "I think you're right. Well, let's put that at the bottom of the agenda and get on with this time business. You 'lose consciousness' as in sleep; where does your consciousness go? I think it simply detaches from the moment at which you go to sleep, and moves

backward or forward along the line of moment-sequence, to some prior or subsequent moment, attaching there."

"Well, why don't we know anything about that?" Blake Hartley asked. "It never seems to happen. We go to sleep tonight, and it's always tomorrow morning when we wake; never day-before-yesterday, or last month, or next year."

"It never . . . or almost never . . . *seems* to happen; you're right there. Know why? Because if the consciousness goes forward, it attaches at a moment when the physical brain contains memories of the previous, consciously unexperienced, moment. You wake, remembering the evening before, because that's the memory contained in your mind at that moment, and back of it are memories of all the events in the interim. See?"

"Yes. But how about backward movement, like this experience of yours?"

"This experience of mine may not be unique, but I never heard of another case like it. What usually happens is that the memories carried back by the consciousness are buried in the subconscious mind. You know how thick the wall between the subconscious and the conscious mind is. These dreams of Dunne's, and the cases in Tyrrell's book, are leakage. That's why precognitions are usually incomplete and distorted, and generally trivial. The wonder isn't that good cases are so few; it's surprising that there are any at all." Allan looked at the papers in front of him. "I haven't begun to theorize about how I managed to remember everything. It may have been the radiations from the bomb, or the effect of the narcotic, or both together, or something at this end, or a combination of all three. But the fact remains that my subconscious barrier didn't function, and everything got through. So, you see, I am obsessed—by my own future identity."

"And I'd been afraid that you'd been, well, taken over by some . . . some outsider." Blake Hartley grinned weakly. "I don't mind admitting, Allan, that what's happened has been a shock. But that other . . . I just couldn't have taken that."

"No. Not and stayed sane. But really, I am your son; the same entity I was yesterday. I've just had what you might call an educational short cut."

"I'll say you have!" His father laughed in real amusement. He discovered that his cigar had gone out, and re-lit it. "Here; if you can remember the next thirty years, suppose you tell me when the War's going to end. This one, I mean."

"The Japanese surrender will be announced at exactly 1901—7:01 P.M. present style—on August 14. A week from Tuesday. Better make sure we have plenty of grub in the house by then. Everything will be closed up tight till Thursday morning; even the restaurants. I remember, we had nothing to eat in the house but some scraps."

"Well! It is handy, having a

prophet in the family! I'll see to it Mrs. Stauber gets plenty of groceries in. . . . Tuesday a week? That's pretty sudden, isn't it?"

"The Japs are going to think so," Allan replied. He went on to describe what was going to happen.

His father swore softly. "You know, I've heard talk about atomic energy, but I thought it was just Buck Rogers stuff. Was that the sort of bomb that got you?"

"That was a firecracker to the bomb that got me. That thing exploded a good ten miles away."

Blake Hartley whistled softly. "And that's going to happen in thirty years! You know, son, if I were you, I wouldn't like to have to know about a thing like that." He looked at Allan for a moment. "Please, if you know, don't ever tell me when I'm going to die."

Allan smiled. "I can't. I had a letter from you just before I left for the front. You were seventy-eight, then, and you were still hunting, and fishing, and flying your own plane. But I'm not going to get killed in any Battle of Buffalo, this time, and if I can prevent it, and I think I can, there won't be any World War III."

"But— You say all time exists, perpetually coexistent and totally present," his father said. "Then it's right there in front of you, and you're getting closer to it, every watch tick."

Allan Hartley shook his head. "You know what I remembered, when Frank Gutchall came to borrow a gun?" he asked. "Well, the other time, I hadn't been home. I'd been swimming at the Canoe Club, with Larry Morton. When I got home, about half an hour from now, I found the house full of cops. Gutchall talked the .38 officers' model out of you, and gone home; he'd shot his wife four times through the body, finished her off with another one back of the ear, and then used his sixth shot to blast his brains out. The cops traced the gun; they took a very poor view of your lending it to him. You never got it back."

"Trust that gang to keep a good gun," the lawyer said.

"I didn't want us to lose it, this time, and I didn't want to see you lose face around City Hall. Gutchalls, of course, are expendable," Allan said. "But my main reason for fixing Frank Gutchall up with a padded cell was that I wanted to know whether or not the future could be altered. I have it on experimental authority that it can be. There must be additional dimensions of time; lines of alternate probabilities. Something like William Seabrook's witch-doctor friend's Fan-Shaped Destiny. When I brought memories of the future back to the present, I added certain factors to the causal chain. That set up an entirely new line of probabilities. On no notice at all, I stopped a murder and a suicide. With thirty years to work, I can stop a world war. I'll have the means to do it, too."

"The means?"

"Unlimited wealth and influence. Here." Allan picked up a sheet

and handed it to his father. "Used properly, we can make two or three million on that, alone. A list of all the Kentucky Derby, Preakness, and Belmont winners to 1970. That'll furnish us primary capital. Then, remember, I was something of a chemist. I took it up, originally, to get background material for one of my detective stories; it fascinated me, and I made it a hobby, and then a source of income. I'm thirty years ahead of any chemist in the world, now. You remember *I. G. Farbenindustrie?* Ten years from now, we'll make them look like pikers."

His father looked at the yellow sheet. "Assault, at eight to one," he said. "I can scrape up about five thousand for that— Yes; in ten years— Any other little operations you have in mind?" he asked.

"About 1950, we start building a political organization, here in Pennsylvania. In 1960, I think we can elect you President. The world situation will be crucial, by that time, and we had a good-natured nonentity in the White House then, who let things go till war became inevitable. I think President Hartley can be trusted to take a strong line of policy. In the meantime, you can read Machiavelli."

"That's my little boy, talking!" Blake Hartley said softly. "All right, son; I'll do just what you tell me, and when you grow up, I'll be president. . . . Let's go get supper, now."

THE END.

U. S. Army Signal Corps

The antenna in any radio system involving weak signal reception is a vital factor. This one bounced a signal off the moon.

NOISE FROM OUTSIDE

BY LORNE MACLAUGHLAN

Are there intelligent entities in other places in the universe? If so, do they communicate by radio? The first question has been posed since the dawn of man's consciousness of self. The second has only recently been investigated. Results so far have been negative, as is often the case in a new field, but there are some unexplained things. . . .

Probably no one will ever know who was the first man to stretch his imagination in speculation on the possibility of life on other worlds, or in other universes than the one we know. The idea has haunted the thinkers of humanity as far back as we have any records of human thought, possibly —who knows?—an almost forgotten legend based on a visit by outsiders. At any rate it is an intriguing idea, and probably the runner-up in interest is the possibility of receiving some communication across the void of space from some extra-Terran intelligence.

In ancient times philosophers spoke and poets sang of the "music of the spheres." Scientists of this century, armed with ultra-sensitive short wave radio receivers and sharply directional antennas have tuned in this "music"—and found it to be pure noise. They have listened to it, measured it, looked at it on cathode ray oscilloscopes, and have found no pleasing sounds or sights or successions of harmonically related modulation frequencies. But the fact that so far this work has led to nothing more interesting than cross-checks on stellar temperatures does not detract from the romance of these investigations, for there is a natural association of radio frequencies with the transmission of intelligence. The use of a better receiver, a more directive antenna or an untried wave length may at any time disclose that something other than pure noise is modulating the electromagnetic waves coming in from

extraterrestrial space. And of course, the development of that better receiver and more directive antenna, and the trial of new wave lengths introduces problems which are themselves worthy of our interest.

One important result of this type of research, coupled with advances in radio technique made during the war, has been to make possible some fairly intelligent guesses as to the equipment necessary for sentient beings to intercommunicate across the spaces separating planets. The more difficult feat of sending out a pulse of radio-frequency energy and receiving its echo from a heavenly body has already been accomplished. On January 10, 1946, U. S. Army Signal Corps engineers, working under Colonel DeWitt, made successful radar contact with the Moon.

To understand the meaning of the results obtained by those workers, who, beginning about 1930, have measured the characteristics of radio waves coming from outside the Earth's atmosphere, we must first know what is meant by the term "pure noise." This refers to voltage, current or power which is not necessarily convertible into audible noise by an electro-mechanical device such as an earphone, but which has the same purely random character as the audible part of the noise which results, for example, when hail or rain falls on a concrete highway.

In the early days of radio, before television, facsimile and radar, the bandwidths amplified by receivers were ordinarily less than the fifteen or twenty-odd thousand cycle range that the ordinary human ear can detect. Back in those days "noise" was noise. The name stuck, and the "grass" on a radar scope is still called noise, although it is the result of random frequencies extending over a range perhaps a hundred times greater than the aural bandwidth.

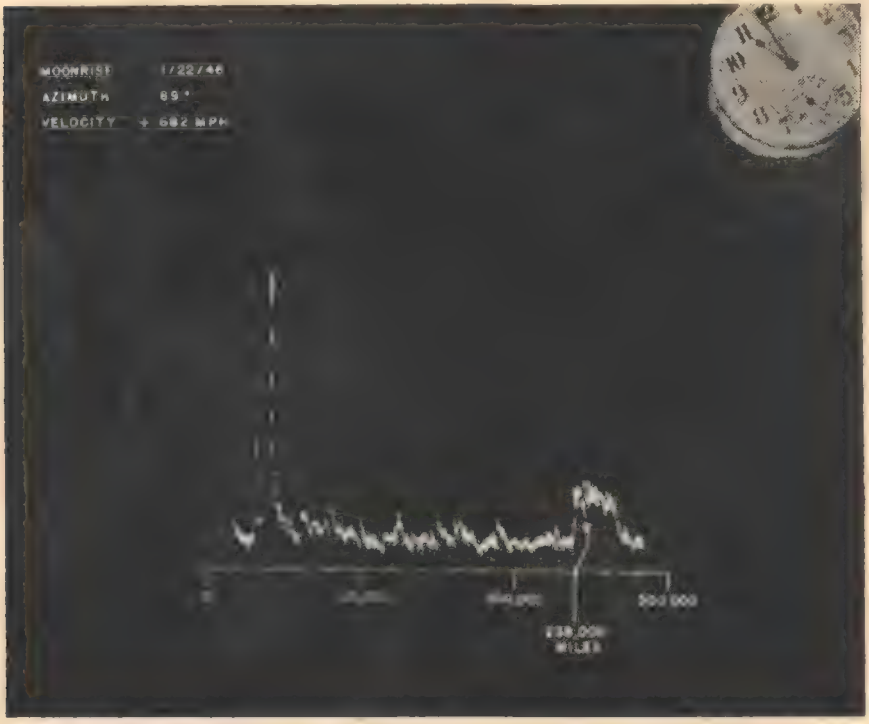
In the specialized radar used to look at echoes from the Moon the original pulse was about a million times longer than in ordinary radar, and the bandwidth was made correspondingly narrower. Thus on the photograph of the famous Moon radar oscilloscope trace, shown here, the pulse is about a quarter of a second long, and the randomly varying noise which can be seen all along the trace contains frequencies from only a few cycles per second on down. In this case then, the noise frequencies are too low to be heard by ear.

It is well-known that other more rhythmic types of interference noise have long plagued the radio engineer, and such types as atmospheric static crashes, ignition noise and leakage from diathermy machines are not all purely random, and can be controlled to some extent by such methods as peak limiting, and the use of frequency modulation. However, even in the absence of man-made static or thunderstorms there is a limit to reception as distance increases, if the transmitter has a fixed and finite amount of

power, no matter how we pile up tubes in our receiver to increase gain or sensitivity. This is true at all frequencies, and for all types of modulation. Noise comes in from somewhere and covers up the feeble signal, till it is lost like a ball in the tall grass.

Where does this noise come from? It may come from literally any place occupied by matter. Every object in the universe containing current carriers—electrons or ions—produces random fluctuations of electromagnetic energy, unless such an object is at zero absolute temperature. The higher the temperature of the matter, and the faster its particles move about, the greater the intensity of the noise.

Now "every object" includes the first circuit and the first tube of our radio receiver, and since noise from these sources is amplified by many thousands of times in a good receiver, they are of primary importance. Figure 1 shows in simplified form the first circuit of a radio receiving set. Let us remove the



U. S. Army Signal Corps

The most widely published cathode-ray trace in history. This is how the moon echo looked to the Signal Corps experimental engineers.

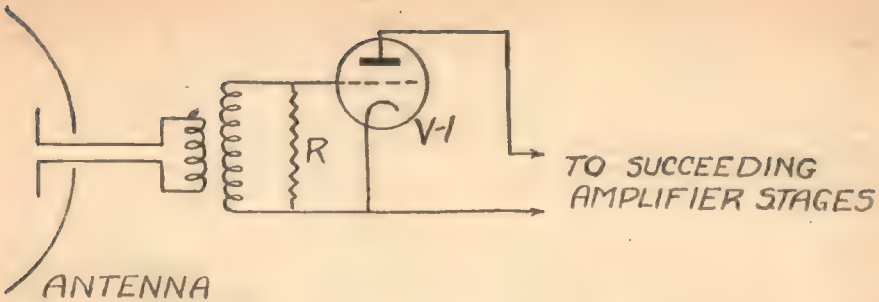


Fig. 1. A typical example of a radio receiver input circuit for use on short waves. The resistor represents grid circuit leakage.

antenna, or short out the antenna coupling coil of such a receiver. The loading resistor, R, on the grid of the first tube, V-1—or the leakage resistance, if there is no grid resistor—will still give us an input signal—of random noise. (This resistance noise is sometimes called Johnson noise after its discoverer, J. B. Johnson.)

The Johnson noise is proportional to absolute temperature as explained above. At once one thinks of reducing the noise at this critical place in the receiver by the use of dry ice, liquid air, or what-not. Unfortunately this will gain us but little. The vacuum tube following the circuit must operate at a certain fairly high temperature, and since it contains electrons, or current carriers, it produces noise which is comparable to that in the first circuit or grid resistor. In other words we have a built-in noise source which just cannot be eliminated. It is comparable to the drag of the engine nacelles in an airplane, which can only be completely eliminated by reducing their size, and incidentally the driving power of the plane, to zero.

But, the noise is also proportional to the size of the resistance which produces it. Can we not use a lower value of resistance on the grid and reduce this noise? Unfortunately, noise is also proportional to bandwidth, and since a lower value of resistance means a greater bandwidth in this circuit we will not gain at all by this maneuver. In fact, we will lose, because other sources of noise of this random type will be able to push more of this undesirable type of signal through our receiver. The bandwidth, in cycles, should be just large enough to pass the type of intelligence being handled, and no larger.

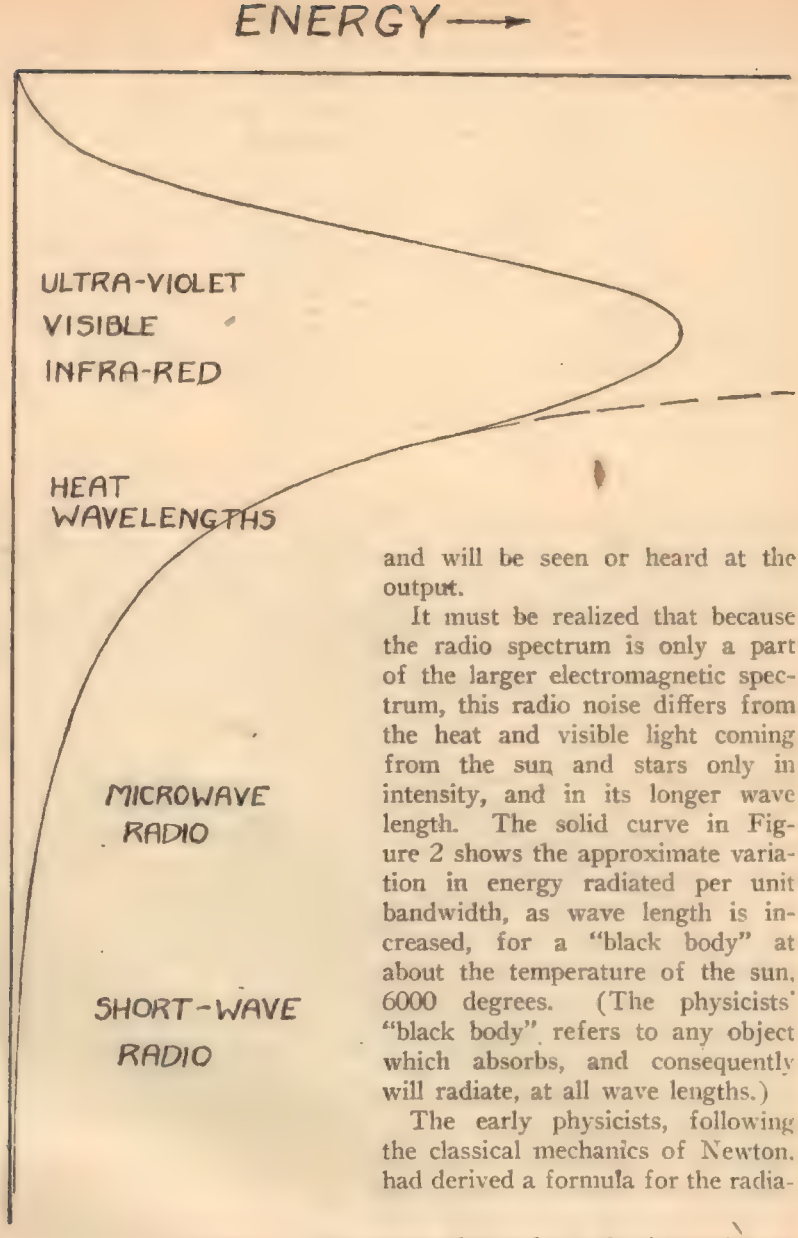
This simplified picture of the problem of first circuit noise must not lead us to believe that the designer of radio receivers can do nothing to reduce the effects of resistance noise and tube noise. It

merely means that there is a definite limit beyond which he cannot go. Good design means that this limit is closely approached, but even this is not easy. To put the basic problem in other terms, the signal-to-noise ratio at the receiver must be made a maximum by reducing noise in the receiver, as well as by increasing the power of the signal at the receiver input terminals.

Now let us put our antenna back on the receiver of Figure 1. Will there be an increase in the amount of noise at the output of the receiver when this is done? The answer, in general, is yes. True, the small amount of added noise may not be perceptible if the receiver is tuned to a wave length where it is small in intensity, or if our receiver is poorly designed. But, in all cases where the antenna is pointed at any object with any temperature above absolute zero, something will be added to the noise signal on the grid of the first tube,

U. S. Army Signal Corps

U. S. Army SCR 584 microwave radar as mounted for field service. This type of antenna produces a sharply focused narrow beam.



and will be seen or heard at the output.

It must be realized that because the radio spectrum is only a part of the larger electromagnetic spectrum, this radio noise differs from the heat and visible light coming from the sun and stars only in intensity, and in its longer wave length. The solid curve in Figure 2 shows the approximate variation in energy radiated per unit bandwidth, as wave length is increased, for a "black body" at about the temperature of the sun, 6000 degrees. (The physicists' "black body" refers to any object which absorbs, and consequently will radiate, at all wave lengths.)

The early physicists, following the classical mechanics of Newton, had derived a formula for the radia-

Fig. 2. The curve shows how the intensity of the sun's radiation varies with its wave length.

tion from a black body which followed the dotted curve of Figure 2. This curve was known to be wrong for some time, because the radiation energies it gave were too high in the ultraviolet to fit in with experimental results—the so-called Ultraviolet Catastrophe. About 1900, Planck proposed the formula which gives the correct solid curve, and in so doing laid the basis of the Quantum Theory. It is usually immaterial which formula we use at radio frequencies, as the curves practically coincide in that region of the spectrum.

It will be noted from the curve that after we pass its peak, the radiation energy drops off as the wave length increases. However—and this is an important point—if the hot body subtends a larger solid angle than the beam of the antenna, the increase in this beam width as the wave length increases results in the antenna collecting more energy. It so happens that this compensates exactly for the drop-off in black body radiation, and we get a constant noise voltage at the antenna terminals. This is as it should be, for it is as though a portion of the hot body in question had been moved up to fill the entire antenna aperture. Thus this constant noise voltage corresponds to that generated by a resistor across the input of a receiver, and black body radiation and Johnson resistance noise are therefore essentially similar.

The joker in all this lies in the statement that the antenna beam width must be narrowed—by making the antenna larger—if we are to have the relation hold up for the sun, for example, which subtends less than one degree of arc. If a parabolic reflector type antenna is used, at ordinary short radio wave lengths such as the 30 meter band used for international broadcasting, it must have an aperture size which dwarfs the new Mount Palomar telescope. As we go to shorter radio wave lengths—or higher frequencies—the antenna size required to make a beam small enough to include only the sun becomes more practical. It must be remembered that the wave length is still so long compared to light wave lengths that the accuracy of construction required is not great. Thus we may note in passing that radar mapping of even the Moon is rather impractical—light wave lengths are still the best bet for mapping.

What all this means is that the sun is nearly invisible at radio frequencies—we need a big reflecting radio-telescope to even get a glimpse of it. However, measurements of the intensity of its radiation in the microwave region from about one to ten centimeters have been made by Southworth. Some of these wave lengths have been used in modern radar, and are particularly convenient because they are short enough—a couple of inches or less—to make the use of waveguide practical. Southworth's measured values of radio noise energy fitted the black body curve based on the accepted temperature of the sun well enough to form a valuable addition to the experimen-

Institute of Radio Engineers

Karl Jansky stumbled onto the Milky Way short wave radio noise with this rotatable narrow beam antenna array and a sensitive receiver.

tal data on this important subject.

Until recently other investigators, working at longer wave lengths, had little success in measuring noise from the sun. Reber, in 1944, reported checks on the black body curve for the sun at a wave length of 1.87 meters—a wave length pretty well on the border line between short-waves and microwaves. During the war British Army Signal Corps radiomen, operating at five meters, more or less accidentally ran across strong noise signals from the sun which corresponded to ridiculously high temperatures. This was later tied in with unusual sunspot activity at the time of the measurements. More recently measurements by a group of Australian scientists showed that this excess radio noise due to sunspots dies away as we go from short radio waves to microwaves—in fact the effect apparently peaks up in the short-wave region at about the wave length used for television broadcasting in recent years.

But these early investigators did detect short-wave radiations coming in from extraterrestrial space, even though they could not "see" the sun. Before considering this earlier and perhaps more startling work in any detail, let us review the three types of noise, or static, that have been mentioned so far. These are:

(1) Resistance noise—or black

body radiation—which follows some fairly simple known laws.

(2) Monochromatic noise, or noise which like colored visible light occupies only certain bands in the electromagnetic spectrum. This includes atmospheric static, which is severe at ordinary broadcast frequencies and disappears in the microwave region. It also includes, as we have seen, sunspot noise. Any mechanism which is ordered, such as that which produces atomic and molecular spectra, may produce radiation of this type.

(3) Finally there are radiations which are produced by intelligent beings. For example a spark gap in a leaky power transformer will produce undesirable radio disturbances. Even messages containing intelligence may sound something like random noise, if we do not

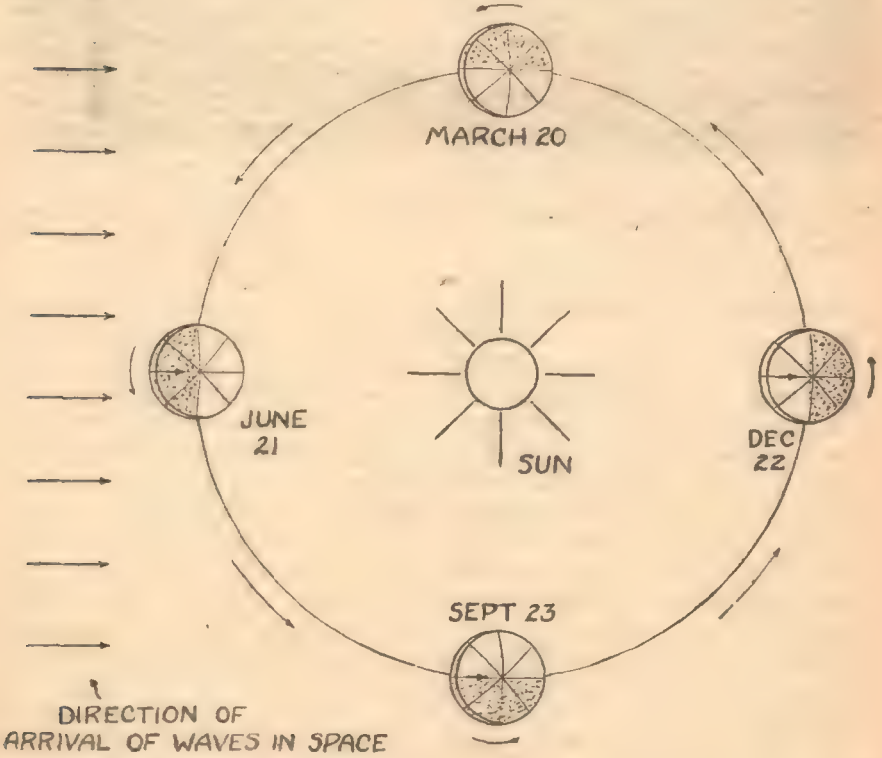


Fig. 3. Radio noise arriving from a fixed point in space shows an apparent change of direction with the advance of the seasons.

have the right deciphering circuits —thus a television broadcast *sounds* much like an undesirable accidentally produced radio noise when fed to a loudspeaker. It does not *look* much better unless it is properly interpreted by a receiver designed to operate from the particular type of synchronizing signals which are applied at the transmitter. It may thus be a type of noise which is well nigh indistinguishable from type 2. Type 1, however, is unique in its purely random structure, and in its independence of wave length as explained above.

In the early 1930s, Jansky, of the Bell Telephone Laboratories, was investigating the strength and direction of arrival of atmospheric disturbances at the short radio wave lengths. It is noteworthy that the wave length used, 14.6 meters, lies well within the band which is most useful for very long distance communication on our planet. Radiation of these wave lengths, if they leave the Earth at a low angle, are reflected back to Earth thousands of miles away by the Heaviside layer of ionized particles. However, radiation striking this layer at a fairly appreciable angle will penetrate it with little deflection.

Jansky was using a highly directional or narrow beam antenna, which could be rotated, in conjunction with a sensitive short-wave receiver. He noted a small amount of noise—over and above receiver noise—when the antenna was aimed in a certain direction. At first this looked like pretty routine stuff—perhaps only the sum of random bits of energy given off by electrons spiraling down towards the north magnetic pole. The usual careful measurement revealed something which was indeed startling and which has led to a great deal of further work by a number of different radio research workers.

The first thing that showed up was a regular change in the direction of arrival of this noise from hour to hour throughout the day. This began to look more interesting, and for a while it was thought that the sun was the source of this noise energy. Again, careful measurement, day after day, showed that although the direction of arrival changed from hour to hour in much the same way each day, *it was not quite the same.* In fact, the direction of arrival was found to repeat in one sidereal day, rather than one solar day. Finally, after observations were made over a period of nearly a year the evidence became conclusive. *The radiation was coming from a fixed point or area in interstellar space.*

The diagram in Figure 3, taken from one of Jansky's papers, shows several views of the Earth as it looks to an observer who is at right angles to the plane of the celestial equator. Relative dimensions have been altered in the diagram, and in this connection it should be pointed out that even if the source of the disturbance were the nearest star, the diameter of the Earth's orbit may be neglected for present purposes. Thus the incoming radia-

This thirty foot diameter parabolic antenna was used by Reber in measuring sun and star noise at very short radio wave lengths. The receiver was mounted in the cylindrical case at the focal point.

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tion is represented by the parallel lines at the left of the diagram. The small arrows show the direction of arrival at the receiving station.

Thus it will be seen that as the

U. S. Army Signal Corps

Parabolic antennas like these used by the U. S. Army as microwave communication relay links could span the interplanetary gap.

Earth rotates about its own axis, waves from a fixed direction in space will change in direction with respect to the Earth, hour by hour, just as do the stars. After a quarter of a year the time of day—solar time—at which waves arrive from a certain direction—Earth coordinates—is six hours earlier than it was originally. In a year the difference is twenty-four hours. If we use sidereal or star time, which is based on the Earth's relation to the stars, the direction of arrival will, of course, repeat at the same time each sidereal day.

Jansky found that the radio-frequency energy from interstellar space was associated with the Milky Way. Whenever his antenna beam was aimed at any part of the Milky Way an increase in the noise output of his receiver was noted. The strongest source of the noise was at a declination of -10 degrees and a right ascension of 18 hours. In this direction lies the center of our galaxy. Because so many stars lie in this direction the black body radiation would be expected to be a maximum here. It was also noted that the noise had apparently the same characteristics as resistance noise. Thus although no energy checks against a black body curve were obtained it was at first assumed that the noise was of this type.

Efforts were made to pick up noise from the sun with this apparatus. They failed, partly because his antenna beam was not narrow enough so that the sun could fill it and exert the full force of its 6000°. However, had a period of intense sunspot activity occurred then, something might have been detected, as we know now.

Reber first reported on his measurements made at 1.87 meters in 1940. His antenna was a metallic parabolic mirror, slightly more than thirty feet in diameter, rather than the more conventional wire antenna array of Jansky's. Because of the shorter wave length Reber's antenna had a more concentrated beam, even though its effective area was roughly the same. Thus he was able to show not only that the strongest cosmic noise arrived from the direction of the constellation of Sagittarius in the Milky Way, but also that there was a split in this energy corresponding to the well-known split in the Milky Way in the region of Cygnus.

Although it seemed, initially, that this, too, was black body radiation from the many stars in our galaxy, Southworth failed to detect energy from this area at microwave frequencies. This fact, plus certain other considerations, has led some scientists to look for a different explanation for Milky Way noise, unless a selective absorption of black body noise in interstellar space can be blamed.

This short-wave noise stands a better chance of being explained as a type 2 noise—produced by some mechanism akin to atmospheric static or spectral lines. Since sunspot noise is of this type it is natural to assume that the added sunspot noise of a million suns might make up this Milky Way noise which we find

feebly filtering across space and through our atmosphere to Earth.

To be thorough we must also ask if these disturbances could be caused by intelligent beings. Millions of messages, on many different frequencies, starting and stopping and swelling and fading, might add up to sound and look like noise. Certainly no one can with certainty say that there might not at least be some message, intelligent to some being, hidden in this noise. But if any great part of these disturbances are the result of activities of other beings, they and their radiations are on such a scale as to be incomprehensible to us in our present stage of groping feebly into space with a new technique.

The most important result of all this work is that the range of wave lengths available for astronomical study has been greatly increased. The radio technique, though advanced along those lines which apply to Earth-bound communications, is in a rudimentary state as far as application to astronomical measurements is concerned. This is particularly true of antenna design, and design of ultra-high frequency narrow-band receivers which can be used to examine the fine structure of the radiations, just as a spectroscope is used at light wave lengths.

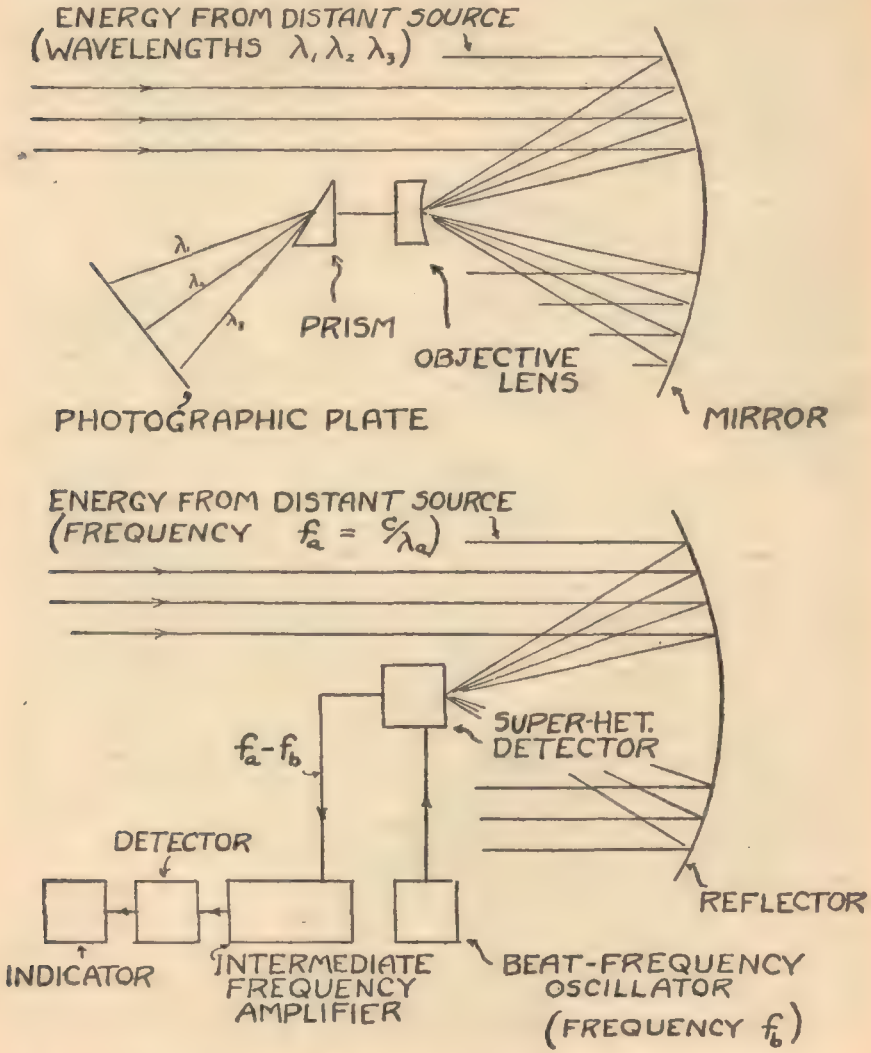
To further clarify the differences and similarities of light-frequency and radio-frequency measurements, simplified diagrams of spectroscope set-ups for the two wave length ranges are shown in Figure 4. The technique used at light wave lengths is to focus the energy falling on a large parabolic mirror in a small objective lens. This energy is then fanned out according to wave length by dispersion in a prism so as to photochemically actuate the emulsion of a photographic plate.

At radio wave lengths one method used involves a superheterodyne detector in place of the objective lens in the first diagram. This mixes the radio-frequency noise energy collected in the parabolic mirror with that from a local beat-frequency oscillator so as to produce energy at a lower frequency. Amplification is more convenient at this lower frequency, called the intermediate frequency—$f_a - f_b$ in the diagram. The greatest advantage in the use of this amplifier is that it may be a fixed tune affair—only the oscillator need be tuned, and possibly the detector. These same factors, of course, help account for the popularity of the superheterodyne circuit in home receivers.

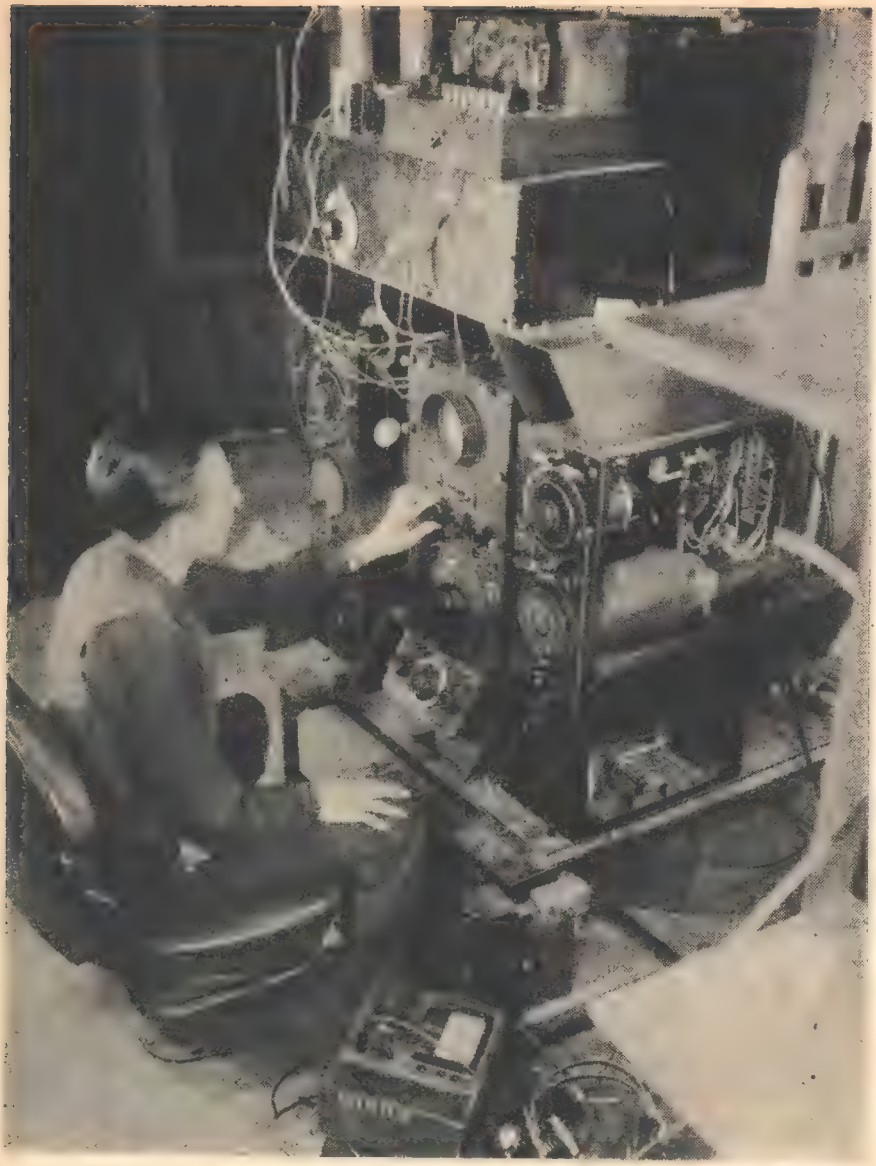
To make a radio-frequency spectrum analysis then, we need only tune one oscillator, and the frequency received may be readily determined, as it is the sum—or difference—of the oscillator and the intermediate frequencies. The resolving power of the prism in the first system has its counterpart in the reciprocal of the bandwidth of the intermediate frequency amplifier—a narrower band here will more effectively separate closely spaced radio frequencies.

Man-made radio interference has

Fig. 4. Examination of a band of radiated energy at either light or radio frequencies is conducted by applying very similar principles.



its counterpart in ordinary astronomy in the reflections of city lights from cloud layers. Scattered light from space causes fogging of the astronomers' photographic plates just as Milky Way noise can contribute to the noise hiding a desired radio signal. Astronomers



U. S. Army Signal Corps

Signal Corps engineer adjusts a control of the moon echo radar apparatus. Experiment was improvised with old type equipment.

have local noise too—infrared plates particularly may be fogged by stray heat which reaches the plate holder.

Exposure times may also be compared—in radio as well as in photographic astronomy longer exposures permit the integration of a weak signal. This is undesirable in either case if a change is taking place which it is desirable to detect. A nova, for example, would be poorly recorded if a continuous exposure were made which covered its total period of superactivity. Similarly, integration of the program from a radio station for an hour would only show that there was a station on a certain frequency, and would fail to distinguish between speech and music.

It is of interest now to consider the problem of radio communication with another planet from the practical point of view. We know from the above discussion of the difficulties that experimenters have had in detecting and measuring the Milky Way and solar noise, that at microwave frequencies our chief limitation will be due to receiver noise. For a bandwidth adequate for human voice communication—4000 cycles—this receiver noise may be as low as 10^{-16} watts, or one ten thousandth of a millionth of a millionth of a watt.

Mars, when nearest the Earth, is about fifty million miles distant. Let us use this distance, and assume that the transmitter, located on one planet, has a power output of about one kilowatt at a wave length of ten centimeters. This power is the maximum allowed in an amateur transmitter in this country, but far less than the peak power of the transmitters used in ten centimeter radars during the war.

This wave length—about four inches—is short enough for the use of wave guides and parabolic antennas. Let us use parabolic dish antennas of the type used in microwave radars. How large will they need to be? Applying recently published transmission formulas we find that a pair of seven foot diameter dishes will barely allow a kilowatt signal to be heard above the noise after its fifty million mile journey.

We must increase the antenna size somewhat to give a bit more margin on the noise. Thirty foot diameter parabolas like the one used by Reber would give an adequate margin. Alternatively the power could be increased to give the needed margin, or part of it. Thus we see that with known techniques, communication with a man on Mars by voice modulated radio is possible, with no more radiated microwave power than would light up ten one hundred watt light bulbs.

Certain practical difficulties have not been mentioned so far. Doppler effect or apparent shift in frequency due to the relative velocities of the transmitting and receiving sites on the two planets would enter the picture. This difficulty may presumably be handled as

satisfactorily as it was in the case of the Moon radar. Atmospheric absorption may take place, but at the wave length we have chosen, the experiments on sun noise show that it is probably negligible. Fading due to unknown causes was observed in the Moon radar experiments, and about this problem little can be said at present, except that it also could probably be handled by means of present known techniques.

Referring to a recent article on the Moon radar by Jack Mofenson we note that in this case the transmitter power was three kilowatts. This power, plus a forty foot square antenna, was needed for radar contact with the Moon, only about a quarter of a million miles away. With smaller antennas, less power and a wider-band —and hence noisier—receiver we have calculated that point-to-point communication is possible over fifty million miles! Of course the shorter wave length assumed in our case—ten centimeters versus about two hundred seventy centimeters in the radar—is to our advantage, for shorter wave lengths make possible a narrower beam from a given size antenna, permitting it to reach out farther. But the main reason why radar calls for so much more in the way of transmitter power and antenna size is because in this case the received power falls off as the fourth power of the distance, rather than as the square of the distance, as in point-to-point communication.

It will be realized then that point-to-point communication with the Moon will be much simpler than radar contact. Also, because it is two hundred times closer to Earth than Mars at its nearest, the problem is much simpler than the one we have discussed—the areas of the antennas could each be decreased by two hundred times, for example. Thus we may expect that within ten minutes after the first voyager to the Moon sets up his little radio station he will find his CQ call answered by approximately one thousand seven hundred forty-three American radio amateurs.

Perhaps ten minutes is exaggerating—in our hypothetical case the radio operator on the Moon may have to wait a few hours until the Moon is visible from North America. In any case radiomen would soon realize that communication with even such a distant station may be easier than bouncing radio waves off the tricky, shifting Heaviside layer to reach someone halfway round the world.

The real limitation will still be noise. Whether we are trying to measure the strange radio emanations of the stars, or to pick up the signal from the first automatic transmitter placed on the Moon by rocket, noise will always have to be reckoned with. We can only reflect philosophically that a universe without radio noise would also be without radio—in fact things would be too chilly for any interest whatever in this most speedy of all systems of communication.

THE END.

PSYCH'S WAR

BY

O. W. HOPKINSON, JR.

***A monomaniac** is normally an undesirable type —but in certain types of work, he'd be highly useful. Provided everything went according to plan—*

Illustrated by Orban

Except for the bobbing object the sea was smooth as batter. The plane had long since gone down leaving a dark and dreary expanse under the moonless sky. The stars, though, were brilliantly hard and occasional ripples from the round object that looked like a man's head distorted and motivated their images like fireflies. It was a perfect night. It was too bad there was no one to enjoy it.

The head came closer to shore, the arms moving regularly and rhythmically with almost mechanical precision. Finally the thing came close enough to the beach to make use of the slight swell. Coasting in with a small comber the manlike figure picked itself from the sand and, without a backward glance stalked purposefully toward the dunes which backdropped the stagelike beach.

Feet slipping and sinking in the soft footing, the hyppo made its way to the road that ran along behind the string of dunes and turned left. With the instinct of a homing bird it sought a particular location, a landmark, a sign.

The cairn might have been a heap of stones and pebbles carelessly thrown together by children playing. It indicated the small car hidden inland from the road, covered with canvas, the edges staked down and sandcovered. With the smooth certainty of an automaton, the hyppo removed the cover, folded it and put it in the back. It opened the door and stepped in. Taking a key from the waterproof pouch at its waist it turned on the ignition, checking methodically the gas, oil and battery supplies. Starting the purring motor it threw the car into gear, backed out of the hiding place and started north along the beach road.

The little car rolled its unerring way into the coastal city, left at the circle, then west along the highway. From Jersey into Pennsylvania by ferry. It had a long wait there although the traffic was light. It did not notice.

Across the ferry the car headed southwest into Pennsylvania. Over the Susquehanna toward a small Pennsylvania town.

On its way the hyppo had no thoughts. Reactions, instructions to follow, yes. It knew there was something about the hands, the retinal pattern. But by no motion did the calm, impassive face betray doubt, hesitation or impatience. These were beyond its scope.

Approximately five miles from its goal the car refused to run. The motor raced, then stalled. Without a moment of delay the hyppo got out and proceeded on foot. With robot like unweariness it paced off the miles, stumbling occasionally over some unexpected impediment in the road but always continuing, changeless of expression, unalterable in purpose.

The hyppo entered the small town, heedless of the darkness, the absence of life, and turned at the first highway leading north. Two miles further it ducked suddenly into the brush after first glancing warily around to make sure there were no observers. With preternaturally keen senses it waited motionlessly in the concealment of a bush to make sure it was not followed. Then, swiftly, it beat into the woods, stopped before a small hill. This was the hyppodrome. Pushing aside the chestnut shoots, the hyppo stepped over the stump and into a tunnel. The tunnel led back on the same level, into the bowels of the hill. Turning at the first branch it stopped before a door, dimly illuminated by an orange glow. The hyppo knocked once, opened the door and entered.

Behind the desk across the room, the officer glanced up. The hyppo saluted, extended its hands and waited.

Waiting, it starved to death.

The captain was highly pleased. H.E., the new Bureau of Espionage, was to be honored with a visit from the biggest brass hat of them all. And a decent one, too, who knew

what he was talking about. Everyone knew that Smarty Carter, Major Carter as he was called in more formal circles, had earned his nickname with the uncanny faculty he had for detecting any trace of the off-color in foreign relations; both above and below board.

About time, too, thought Captain Machail. About time, indeed. With the reports that had been going out of his station for the last eight months, he'd at least expected a delegation from the Cabinet, maybe the President himself. Well, Carter would have to do for the time being. Anyway he'd give Machail a chance to let loose. Ever since the captain had been assigned to this division by reason of certain tests, he'd waited, bursting, for the chance to tell someone about the incredible things there were going on in this little subterranean retreat under an Appalachian foothill. He rustled papers restlessly. When a thing is clever beyond a man's wildest dreams and at the same time secret as the core of the moon, thought Machail, a fellow has a hard time containing himself. And then, if you add on what they did to old Carter last week, it was just too good to keep quiet.

A knock on the door snapped him to his feet, eagerly. A lean, tigerish man in a major's uniform strode in, accompanied by a lieutenant.

"Major Carter, Captain Machail," intoned the lieutenant, after an exchange of salutes. The men shook hands. Machail dismissed the lieutenant and motioned to a chair.

The major nodded and sat down. Taking out a cigar case he leaned over, offering one to the captain.

"At ease, Machail. As usual," he smiled.

"Thanks," returned the captain, biting the end of the cigar and holding a match for the major. One does not deign to sniff at cigars offered by superiors, even old friends. He inhaled with evident enjoyment and relaxed in the swivel chair.

"Well, sir?"

Carter leaned back and puffed smoke at the ceiling.

"The works," he said smiling. "The works. Spare nothing, dream nothing. Just the plain, unvarnished truth about these reports you fellows have been sending in." He blew a ring at the desk lamp and grinned. "I used to think I was pretty hot at one time. But the stuff we've been getting from H.E. is high explosives —literally. It's unbelievable. So how about the low-down?"

The captain was tickled.

"I've all the information you want," he said, "and the authority to hand it over. Much good may it do you."

"Seeing as how identification gave me a clean bill," added the major. They both chuckled. Captain Machail had worked under Carter more times than he could remember. But retinal patterns were required and retinal patterns they got. He stood up.

"If you'll follow me, sir—"

The major glanced inquisitively at his cigar. Machail nodded.

"It's O.K.," he said. "As a matter of fact, you'll be surprised at the lack of discipline. But don't let it

bother you. I, for one, can maintain that our orders are obeyed to the letter. The absolute letter."

Opening the door, the two officers proceeded out into the dark corridor, Machail leading the major toward a small elevator.

"I'm taking you first to the shot room. From there we'll follow through the series of testing labs and finally to indoctrination." He chuckled. "That's a nice, friendly word for what we're doing." He put his finger on the top button of the board and turned to Carter. "Of course, you haven't been told of your release procedure?"

The visitor shook his head.

Machail laughed. "It's very unusual. And very effective. Do you remember Lieutenant Neil?" he added irrelevantly. "You met him at a party last week—just after you'd expressed your wish to visit H.E.?"

The major looked puzzled.

"No, of course not. We'll remedy that for the duration of your visit. Before leaving you'll have to forget the whole thing, including Neil's manipulations. But you'll be none the worse. We'll take care of that."

The elevator came to a stop and the door slid open. The two emerged into a hall which was the exact duplicate of the one they had just left.

"You see," Machail went on, "the less important details are carried on near the surface. As the indoctrinee descends from level to level he becomes better prepared and therefore the consequences of destruction grow steadily greater. The last and lowest level contains the rendezvous, the appointment rooms. Which are, of course, the culmination of the total process." Pausing in his talk he stepped to a door and pushed it open. "This is the reception center." They walked in.

"Martin!"

"Here, sir."

"Pembroke!"

"Here, sir."

"Bonati!"

"Here, sir."

Down the line of ten men, each one answering as his name was called. The sergeant behind the desk inspected them as they answered the roll. He put down the paper from which he'd read the names, took out a pack of cigarettes and lit one. Then he leaned back in his chair, put his hands behind his head and his feet on the desk.

"O.K., boys," he directed. "Relax."

Feet parted, hands clasped behind buttocks.

The sergeant shook his head.

"Nah. I said relax. Like me. The first thing you've got to get through your heads is the fact that there's little discipline here. No tough guys, no bawling outs, no hard work. Pull up those chairs behind you and take it easy."

The men looked uncertainly around and then turned to the row of chairs standing against the wall. Feet shuffled and leather creaked as they settled their weight. Some of them lit cigarettes, one pulled out a pipe.

The sergeant nodded approvingly. "That's better," he told them. He glanced around and spied the visitors. He stood abruptly and walked

over, uncertain as he spotted the major, whether his remarks applied in this case. Machail waved a negligent hand. "Forget it," he directed. He spoke briefly and the sergeant nodded.

"Sure," he said and sat down at the desk. "Don't mind them," he ordered. "They just stopped in for a look around." Then he glanced at Machail who inclined his head and grasped the major by the arm. He indicated the door with a jerk.

Outside, Machail leaned over and whispered to Carter. "They can't be at ease with us in there," he told him. "Come on around to the observation room."

He led the way through another door, marked private and went over to the wall. He turned off the light and moved a panel. A small slit of light appeared and Carter heard the sergeant's voice.

". . . and you'll get along better the easier you take it. You guys don't know what it's all about yet but I'm tellin' you the first thing you gotta get through your heads is relax, take it easy."

Through the crack Carter could see that the words were having an effect. The indoctrinees were taking the advice literally. They were sprawled in all sorts of positions. The pipe smoker had thrown one leg over the arm of the chair and was staring at the ceiling, pouring out clouds of fragrance. The sergeant continued.

"All you guys have been brought here because you passed a test. You don't remember the test. Nobody does—who passed it, that is. Never mind about the guys who don't pass it. That's none of your business. But from here on down you'll work with a guy you've met before. Some of you will even recognize a good friend. That's all right. He's still a good friend. But just the same, he's doin' his duty, same like the rest of us. So don't hold it against him. And don't be surprised at anything you see or hear."

The sergeant leisurely snuffed out his butt in an ashtray. "Well, that's about all, I guess. Any time you guys are ready to leave, we'll get along. NO, take your time, take your time. Just remember what I said. Relax and don't take everything you hear for an order."

Machail slid the panel closed and snapped on the overhead light. Carter had a quizzical expression on his face. He looked at the captain who could hardly conceal his glee.

"Don't remember a thing, do you, major?" he asked. Carter shook his head slowly.

"Nope," he murmured, "not a thing."

The captain took his arm. "Let's go," he directed.

They stepped out into the corridor. The indoctrinees from the next room were lined up before the elevator waiting for it to arrive. Respectfully they parted to make way for the two officers. Machail shook his head.

"You first," he told them. They grinned and commented among themselves as they shuffled, by fives into the car and were dropped to the next level.

Below, Machail led the way to another room. One which displayed a red light over the door. The usual orange was missing although there was a darkened bulb next to the red. Machail leaned against the door post and offered the major a cigarette.

"We'll have to wait," he whispered. "There's a trance going on."

Carter declined in favor of his own cigar.

"Trance?" he questioned. "I don't get it."

At that moment the door opened and a lieutenant slipped into the hallway. Carter started in surprise.

"Neil!" he ejaculated. Machail winked at the man. Neil extended his hand.

"Hello Carter, Hi Machail," he greeted. "I see you got here eventually," he smiled at the major.

Machail laughed softly.

"Yep," he said, "the major is here to get a brainful." He jerked his thumb at the closed door. "Any chance of seeing something?"

Lieutenant Neil nodded.

"Couple of minutes," he told them. "The guy wanted a cigarette before we started so I ducked out to get some."

Machail held out his own pack. "Help yourself," he directed. Neil took a couple and nodded his thanks.

"Wait about ten minutes," he said. "I'll call you in when he's ready." He ducked back into the room.

Carter wiped his forehead bewilderedly. "It's . . . it's funny," he muttered. "I do remember now. That party—the six of us—Neil was there. He suggested a game. We tried it and . . . and—"

Machail was in transports of joy.

"Yeah," he chortled. "Neil just snapped you out of it. He would have done it in a short while, sometime during your visit here but just now was as good a time as any. Did you see him touch his right ear when he saw you?"

Carter nodded slowly.

"That," said Machail, "was the signal. He gave you that command at the party last week. When you told Headquarters that you wanted to see Hypnotic Espionage, you were such a big shot that they couldn't very well put you off. So Neil was put on your tail to determine your suggestibility, and, if possible, shoot job he did."

Carter scratched his ear with the cigar.

"H.E.—Hypnotic Espionage. So that's what's going on. The secrecy, the preliminary test—"

"Because it works—beautifully," continued Machail. "And don't let me hear you start spouting rubbish because you're the perfect example yourself. You don't deny that?"

The major grinned ruefully. "So I'm the perfect subject. The susceptible man. Who'd have thought it?" the works to you. And a very nice

Machail clapped him on the shoulder.

"Don't feel so bad," he grinned. "It doesn't necessarily mean a thing. Suggestibility as a mental trait does not mean a weak personality or character. They are not tied together in any way, organically or psychologi-

cally. That fallacy arose through the reverse process. A man may be so susceptible that his character is founded upon the suggestions and influence of others. On the other hand, a personality which is strongly individual may be susceptible to commands given under particularly favorable circumstances. That's you."

Machail was gratified. It had come out at last, the lovely secret he'd been waiting for so long to pass on. The delicious morsel he'd had to keep to himself until just the right moment.

"And yours is the hardest type to find," he went on. "Generally we recruit from the ranks of the others, the milquetoasts who've been made that way by their susceptibility. Hypnotic subjects with strong characters are hard to find. Neil was quite pleased with himself."

"I'll beat his head in," muttered the major.

The aforementioned head was at that moment thrust out under the red light. Machail in burlesque made a grab for the major's arm. Neil ducked in mock surprise.

"Found out, has he?" he asked. Carter's face broke into a smile.

"Snake," he commented. "Viper."

Neil shrugged his shoulders good-naturedly.

"I'm used to it," he said. "But come on in. No loud noises, though. This is an initial. Later on I'll have him down so far he'll ride a roc and not even know it's going off."

The two men tiptoed in after the lieutenant.

In one corner of the room was an easy-chair with a softly glowing floor lamp beside it. In the chair half sat, half lay, a man in the uniform of a corporal. His head was thrown against the backrest, his breathing easy, though shallow. Neil felt his pulse and nodded.

"Cut down the pulse rate, just for a trier," he spoke over his shoulder. "This boy went under so fast I thought he'd be a pretty safe bet." He turned to the officers. "Incidentally this is my last for today. If you like, I'll go along with you."

Machail looked at the major inquiringly. Carter nodded.

"Sure," he agreed. "Glad to have you." Neil leaned over the figure in the chair. Carefully he pulled up one eyelid. He nodded to himself. Then, straightening and speaking in a quiet tone he gave his final instructions.

"You will be susceptible to and under my control at any time I command it by touching my left ear. You are falling into a natural sleep," he droned. At the end of five minutes you will awaken, normal in every respect except that you will not remember this occasion. You will go about the evening according to your regular schedule."

The three men left the room quietly. As the door was pulled to behind him Carter heard the faint, tremulous sounds of a growing snore.

"This is the next stage," said Neil. "Here, for instance, is Lawrence."

The private shook hands with the major, completely at ease.

"Lawrence," directed Neil, "how about telling Major Carter what you've been doing since you came here."

"Certainly," the boy smiled eagerly as he turned to the officer. "We're having a swell time. Movies whenever we want. Good eats, leisure to read. And nobody to yell at us or order us around. It sure is swell. The only trouble is I don't know what it's all about yet." He paused and shrugged. "Oh, well, I guess that'll come out in good time."

"How about your pet?" asked Neil, rubbing his chin.

"Oh sure, of course," went on the private, shamefacedly. "Sure, that's the best of all. We can keep pets if we want to. Like Tippie here," he gestured toward his feet. "Here, Tip, shake hands with the major."

Carter glanced down, then up, looking hard at Lawrence. He scowled. "What the—" he began. The captain nudged him. "Pretend," he hissed. Carter looked from Machail to Neil. Lawrence was bending over, going through the motions of patting a small dog.

"Come on Tip, good dog. Atsa boy." Carter shrugged, leaned over and went through the make-believe.

"Intelligent, isn't he," crowed Lawrence. "Only took me about five minutes to teach him that one.

Eh, fella?" He looked down affectionately. "Want to see him do another? I'll show you one that's a peach. Here Tip—"

"No, I don't think we have time," broke in Neil, touching his chin again. "We've got to be getting along." Lawrence smiled and started to walk away.

"Don't forget, Lawrence," called Neil, "no pets. Absolutely no dogs allowed in this place. We have to be strict on that score."

The private grinned over his shoulder and winked at the major. "He's always pulling that stuff," he said. "Pets? Who would want to keep a pet here? Besides, I don't like 'em."

Carter's eyebrows jerked up in astonishment. He started after the retreating man. "If he thinks he's pulling my leg—" he began.

Machail stopped him.

"Cut it," he directed. "Didn't you see Neil controlling him? That's one of the advanced subjects. Neil has him so he can throw him in and out of trance without his knowing it. When he goes in he always has a pet dog. When he comes out, no dog." Neil gave his affirmation.

"It's easy once you've got them going," he explained. He scratched his head. "Just the same, they get too realistic. Sometimes I wonder if it isn't me who's under when I see how some of them carry on."

Machail found himself busy expostulating to an almost deaf ear as he dragged Carter to the elevator. It took a lot of talking between the two of them to convince the major that he should take them seriously.

Suddenly Neil snapped his fingers. Carter shied away nervously. Machail saw the reaction and laughed.

"Don't worry, major," he said. "You're O.K. now. And all you'll get when you leave is a post-hypnotic forgettery."

Neil was pulling them out of the car.

"I've got just the thing," he informed them. "Major, you remember Sergeant Nicholas?"

"Certainly," was the reply. "He was on my post for three years until he was assigned elsewhere—" His voice trailed off. "Here?" he asked weakly. Machail nodded.

"Know anything about him?" continued Neil. "Background, training, that sort of thing?"

"Well, a little. Know his parents slightly. He came from my town. Of course I know some of the things you run across in the course of ordinary friendly conversation."

"Would you say he was a student?" asked Neil.

"Definitely not. Brains, yes, but not the scholarly type."

"Couldn't speak a foreign language?"

"Nope," said Carter. "Know him that well. Didn't get to college and his people were American. Born here, no outside influence."

Neil nodded. "In here a moment."

They passed into another little room, similar to the ones the major had seen on higher levels. A young man in a sergeant's uniform arose stiffly as they came in.

"Hello, Nicholas," Carter called out advancing with his hand extended. The sergeant looked at him disdainfully. He glanced at the others

and spoke rapidly a gibberish which was all but unintelligible. Carter stopped as though he'd been struck. He turned from one to the other querulously.

"Now what?" he asked.

"Five months of intensive study augmented by hypnotic influence. Trance instruction and post-hypnotic concentration. Hypnotic memory. Right now he's under. Hence his nonrecognition and inability to speak English. When he's finished here he will talk, think and feel in that language. It will be his native tongue as far as he knows."

"Incredible," breathed Carter.

"Elementary," smiled Neil.

"*Lieber Gott!*" snarled Nicholas with feeling, turning his back on the trio.

Back in the office, Machail leaned comfortably in his chair. Neil smoked a cigarette, sitting on a corner of the desk. Carter looked uncomfortably from one to the other.

"And it actually works. Of course—it must. Those reports—" He shook his head.

"Certainly it works." Neil was amused. "You've seen the others. The man who held a cigarette under his armpit till it was extinguished. Then screamed in anguish when a pencil was held to his breast. How can you torture the truth from a man like that? We incorporate those two reactions. When one of our agents leaves here he actually feels no pain, he can't be coerced physically but he gives an absolutely realistic performance when subjected to violent questioning."

"He has complete purpose, the most complete purpose in the world. It is impossible for him to have an aim other than the one we have given him. He may dissimulate in any way whatsoever to achieve this aim. His senses have been made hypersensitive to further him. He has a personality that has been tailored to the occasion and a language that is more natural than his own."

"And, best of all, there is no chance of his losing his information once he has obtained it. For the only man who can receive his report is the one who has handled him directly and who is *en rapport,* hypnotically speaking, with the agent, and his only control. That cannot be faked."

Neil snuffed out the butt of his cigarette and clasped his hands around his knee.

"When he has finished," he continued, "he finds his way to the rendezvous with unerring accuracy at the appointed time. He simply can't help it. He has been commanded to return here, show his prints and retinal pattern for the sake of safety, and then report to his control. There he completes his mission."

"But," broke in Carter, "what's to prevent him from giving his information to the wrong man?"

"Neil has told you," said Machail, "that only the man who has hypnotized him is able to bring him out of it. Only this man is able to control the agent. When he finds him he gives his report and then is restored to normalcy."

Carter bit savagely at the end of

his fourth cigar. "I don't like it," he protested. "What about that boy on the third level. The one with the dog. Suppose something goes wrong. The receiving officer, the control—the whole place."

Neil's smile faded. "That, sir, is one of the chances we have to face. The men are fully informed before their final instructions are issued. They make the choice voluntarily. If they decide not to take it they are hypnotized, their minds cleansed, false memory of unimportant work substituted for their stay here and they are transferred."

"Yes, yes," barked the major, "I can see that. But suppose, just suppose that something went wrong. Suppose one of the agents came back and there was no receiving officer for him—something like that. What would happen?"

Neil dropped his eyes to the floor. Machail shifted nervously in the chair.

"Well?" snapped Carter.

"He'd be better off dead," said Machail, "because he certainly would not be a man."

Approximately five miles from its goal the car refused to run. The motor raced and then stalled as the wheels caught in a great split across the highway. The hyppo got out and proceeded on foot, dodging the fallen rubble, the wreckage that surrounded him. With robotlike unweariness he paced off the miles, climbing, stumbling, crawling, but always continuing, changeless of expression, unalterable in purpose.

The hyppo crept through the massed tumble of the small town, detected the faint remains of a highway leading north. Two miles farther he ducked as though he were creeping under foliage although the almost flat plain disclosed no growth. He looked warily around to make certain that he was not observed.

With preternaturally keen sense he waited motionlessly crouched as though in concealment, spreading imaginary branches to make sure he was not followed. Then, swiftly, he crunched across the featureless plain, stopped suddenly. Pushing aside more imaginary growth he stepped high, then proceeded on his way. Turning a few yards further he walked at right angles to his former path for a distance of thirty or forty feet. He raised his hand as though knocking at a door then turned an imaginary knob.

He stepped forward three paces, lifted his hand in salute.

Then he extended his hands and waited.

Waiting, he starved to death.

THE END.

★ ★ ★ ★ ★

PROJECT

BY LEWIS PADGETT

There's the old saying that, to train a dog, you must be smarter than the dog. A sound proposition, too. It would apply to other projects, too . . .

Illustrated by Napoli

Mar Vista General had been in existence as a research unit for eighty-four years. Technically it was classed as a service. Actually it was something else. Not since its metamorphosis from a hospital in the middle of the twentieth century had an outsider entered Mar Vista.

For, if they entered, they had already been elected to the Council. And only the Council itself knew what that implied.

Mary Gregson crushed out a cigarette and said, "We've got to postpone the visit! In fact—we've got to keep Mitchell out of here!"

Samuel Ashworth, a thin, dark, undistinguished-looking young man, shook his head in reproof. "Quite impossible. There's been too much anti-Council feeling built up already. It's a concession that we don't have to entertain an entire investigating committee."

"One man's as bad as a committee," Mary snapped. "You know as well as I do what will happen. Mitchell will talk, and—"

"And?"

"How can we defend ourselves?"

Ashworth glanced around at the other members of the Council. There weren't many present, though Mar Vista General housed thirty men and thirty women. Most of them were busy at their tasks. Ashworth said, "Well, we face extinction. We know that would probably ruin the present culture. Only Mar Vista General has stabilized it this far. Once the Central Power stations are activated, we'll be able

to defend ourselves and enforce our wishes. That we're sure of."

"They're not activated yet," said Bronson sourly. He was a white-haired surgical specialist whose pessimism seemed to increase yearly. "We've been putting this crisis off too long. It's come to a showndown. Mitchell has said—let me in *now*, or else. If we let him in—"

"Can't we fake it?" somebody asked.

Mary said, "Rebuild the whole General in a few hours?"

Ashworth said mildly, "When Mitchell comes in the gates, there'll be thousands of people waiting at their televisors to see him come out. There's so much tension and ill-feeling against us that we don't dare try any tricks. I still say—tell Mitchell the truth."

"You're crazy," Bronson growled. "We'd be lynched."

"We broke a law," Ashworth admitted, "but it's proved successful. It's saved mankind."

"If you tell a blind man he was walking on the edge of a cliff, he might believe you and he might not. Especially if you asked him for a reward for rescuing him."

Ashworth smiled. "I'm not saying we can convince Mitchell. I *am* saying we can delay him. Work on the Central Power project is going forward steadily. A few hours may make all the difference. Once the stations are activated, we can do as we please."

Mary Gregson hesitated over another cigarette. "I'm beginning to swing over to your side, Sam. Mitchell has to report every fifteen minutes, by visor, to the world."

"A precaution. To make sure he's safe. It shows what a spot we're in, if the people suspect us that much."

Mary said, "Well, he's going through the Lower College now. But that's never been top secret. It won't delay him long. He'll be hammering at the door pretty soon. How long do we have?"

"I don't know," Ashworth admitted. "It's a gamble. We can't send out rush orders to finish the Power stations instantly. We'd tip our hand. When they're activated, we'll be notified—but till then, we've got to confuse and delay Mitchell. For my money, nothing would confuse and delay him more than the truth. Psychology's my specialty, you know. I think I could hold the line."

"You know what it means?" Mary asked, and Ashworth met her eyes steadily.

He nodded.

"Yes," he said. "I know exactly what it means."

Mar Vista General was a gigantic, windowless, featureless white block set like an altar in the midst of acres of technical constructions. Hundreds of specialized buildings covering all branches of science made a sea of which Mar Vista General was the central island. The sea was navigable; it was the Lower College, open to the public, who could watch the technicians working out plans and processes that had

come from the inviolate island of Mar Vista General.

The white building had a small gateway of metal, on which was embossed WE SERVE. Under it was the anachronistic serpent-staff of Aesculapius, relic of the days when Mar Vista had actually been a hospital.

The white building was isolated, but there were lines of communication. Underground pneumatic tubes ran to the Lower College. Televisors transmitted blueprints and plans. But no outsider ever passed those metal gates, just as no Councilman or Councilwoman ever left Mar Vista General—until the fifteen-year tenure of office had expired. Even then—

That matter was secret too. In fact, a great deal of history, for the last eighty-odd years, was secret. The text-tapes truthfully described World War II and the atomic blast—all accurate enough—but the years of unrest culminating in the Second American Revolution were subtly twisted so that students missed the true implications. The radioactive crater that had supplanted St. Louis, former rail and shipping center, remained a monument to the ambitions of the Revolutionists, led by Simon Vankirk, the sociology teacher turned rabble-rouser, and the present centralized, autocratic world government was a monument to the defeat of Vankirk's armies. Now the Global Unit held power, a developed coalition of the governments of the former great powers.

And time had stepped up its pace. Progress moves in direct ratio to technological advances. Unless, of course, those advances come so rapidly that humanity lags behind, and then there is the danger of war and chaos. But the Second Revolution had been stopped before Vankirk crossed the Mississippi on his way eastward, and thereafter the Global Unit had appeared—and enforced its laws very firmly.

Five hundred years of progress had been compressed into eight decades. The present world would have seemed quite strange to a visitor from 1950. The background and history of the new set-up could have been made clear to such an improbable visitor, by the text tapes, with their detailed charts and graphs, but—

The text tapes would have lied.

Senator Rufus Mitchell might have been a butcher or a politician. He belonged in an old-fashioned cartoon, with his jowled red face, his two-and-a-half chins, his swag belly, and the enormous cigar jutting from firm, skeptical lips at a sharp angle. Which merely proves that types continue indefinitely; Cruikshank had drawn Mitchells, but not as politicians; today, Rufus Mitchell was a hard-headed, clever, iconoclastic man who could smell a bomb's proximity fuse before it came too close. He hoped so, anyway. That was why he had managed to create the Commission, despite opposition of the *laissez-faire* bloc in the Global Unit.

"Open covenants openly arrived at," he shouted, hoping to confuse his opponent both by decibels and

semantic ambiguity. But sleek, smiling Senator Quinn wasn't having any. He was an old man, with silvery white hair and a buttery voice, and now he drank his surrogate highball and lay back, watching figures move in a slow dance on the ceiling screen.

"Do you know what you're talking about, Rufus?" he murmured.

Mitchell said, "The Global Unit doesn't work behind closed doors. Why should Mar Vista General?"

"Because all the knowledge would leak out if the doors were opened," Quinn said. They were in a lounge, resting, after their selective tour of the Lower College, and Mitchell was wishing he'd had another partner instead of Quinn. The man was ready to give up now!

"I'm satisfied," Quinn remarked, after a pause. "I don't know what the devil you want, anyhow."

Mitchell lowered his voice. "You know as well as I do that Mar Vista's advice is a little more than that. We haven't turned down a recommendation from this place since the Global Unit started."

"Well? The world's running along nicely, isn't it?"

Mitchell stabbed his cigar at his fellow solon. "Who runs the planet? Global Unit—or Mar Vista?"

Quinn said, "Suppose Mar Vista runs it. Would you be willing to immure yourself in the place, under totally abnormal conditions, just so you could have the pleasure of knowing you were one of the bosses? The Franciscan friars had a smart idea. They had to give away all their worldly possessions and take a vow of poverty before they could become friars. Nobody envied them. Nobody envies the Council."

"How do we know what goes on in Mar Vista?"

"At worst it's an Arabian Nights' heaven. Or at best."

"Listen," Mitchell said, changing his approach. "I don't care what their pleasures are. I want to know what they're *up* to. They're running the world. Well—it's time they showed their hand. I still don't see any reason for the Central Power project."

"Well, don't look at me. I'm no electrophysicist. I gather that we'll be able to tune in on a power supply from anywhere. And unlimited power."

"Unlimited," Mitchell nodded. "But why? It's dangerous. Atomic power has been rigidly controlled for eighty years. That's why the planet's still here. If anybody can tune in—anybody can play with neutrons. You know what that might mean."

Quinn wearily ticked off points on his fingers. "We have the enforced census. We have enforced psychological tests. We have a spy system and we have revoked the habeas corpus. Not to mention a lot of similar safeguards. The Global Unit has absolute power, and can control the life of everybody on earth, practically speaking."

"But Mar Vista General has absolute power over the Global Unit," Mitchell said triumphantly. "We've

seen the Lower College, and there's nothing to see except a lot of technicians. And gadgets."

"Oh, blah."

"Sit back and drink your surrogate," Mitchell said. "When the Central Power stations are activated, anyone can tune it. But sit back and swig away. There may be another atomic war. There may be more mutants. This time they may grow up."

"They can't," Quinn said. "The smart ones are nonviable."

"Oh, blah," Mitchell plagiarized.

Quinn said, rather wearily, "You know very well that the only truly dangerous mutations are so alien they show their stigmata before maturation. Once they turn blue or sprout extra hands or tentatively try to fly, they can be spotted and destroyed. But there aren't any more mutants, and you're a scaremonger. I can't stop you from going to Mar Vista if you want. Only I don't see the reason. You've a lifetime tenure of office as senior senator."

Mitchell said, "I represent the people." He hesitated, and then, oddly, laughed. "I know. It's a cliché. But I do feel a responsibility."

"To get your picture on the newstapes."

"I've done research on this subject. I've found some hints and clues."

"The *status quo* is safe," Quinn said.

"Is it? Well, here's our guide. Do you want to wait here, or—"

"I'll wait here," Quinn said, settling back comfortably with a fresh drink.

Here and there, at selected spots on the earth's surface, men worked at intricate tasks. The Central Power stations were metal hemispheres, smooth as glass outside, complicated as a maze within. The setting-up was in its final phase. The actual construction had not taken long, for advances in engineering had been fantastically rapid. In 1950 the job would have lasted for ten years. Now it took three months, from inception to near-completion. Delicate balance-checks and precision integration were the final factors, and that was going on now.

The Global Unit had authorized the installation of Central Power. But the suggestion, with detailed plans, had come from Mar Vista General.

All over the world the stations were spotted. A changed world. Different, far different, from the world of eighty years before.

Physically it had altered.

And, mentally, the outlook had altered, too.

Senator Quinn underestimated Mitchell. He saw his colleague as a big, bumbling, interfering man, and failed to realize that Mitchell inevitably got what he wanted, even when the results were only satisfaction or information. Mitchell, for all his carpet-bagging exterior, was extremely intelligent —and practical. The combination of those two abilities made him,

perhaps, the one best fitted to investigate Mar Vista General.

Councilwoman Mary Gregson, however, did not underestimate the visitor. She had already seen Mitchell's psych and IQ charts, in the private files, and could not help feeling dubious about Ashworth's plan. She watched him now, a thin, dark, mild young man with a shy smile and intent eyes, as he stood beside her facing the transparent inner door.

He glanced at her. "Worried?"

"Yes."

"Can't be helped. We need you to explain the biogenetic angles to the senator. Here he comes." They turned toward the widening strip of daylight as the great metal gates slowly opened. Framed between them was Mitchell's burly figure, stooping forward a little as though he peered into the darkness that faced him.

Now the darkness lightened. Mitchell silently came forward. As the gates closed behind him, the inner door opened, and Ashworth sighed and touched the woman's hand.

"Now."

She said, in a quick whisper, "We'll be notified as soon as the stations are activated. Then—"

"Hello, senator," Ashworth said loudly, giving a half-salute. "Come in. This is Councilwoman Mary Gregson. I'm Samuel Ashworth."

Mitchell approached and shook hands. He kept his mouth tight. Ashworth said, "I don't know what you're expecting, but I think you're going to be surprised. I suppose you realize that you're the first outsider ever to enter Mar Vista General."

"I know that," Mitchell said. "That's why I'm here. Are you in charge, Councilman?"

"No. This is a democratic Council. Nobody's in charge. We're appointed to show you around. Ready?"

Mitchell brought out a small black gadget from his pocket and spoke into it. "I report every quarter hour," he said, snapping the tiny visor attachment open. "This is keyed to my voice, and it has a special combination as well. Yes, I'm ready." He put the device away.

Mary said, "We want to show you around Mar Vista first of all. Then we'll make explanations and answer any questions you want to ask. But no questions till you get an over-all picture. Is that agreeable?" The Council had decided that this was the best method of playing for time. Whether or not it would work with Mitchell, Mary could not know; but she was relieved when he nodded casually.

"That'll do nicely. What about protective suits? Or—" He studied Ashworth and the woman closely. "You seem normal enough."

"We are," Ashworth said dryly. "No questions yet, though."

Mitchell hesitated, toyed with his cigar, and finally nodded again. But his eyes were wary. He stared around the bare little room.

Mary said, "This is an elevator.

We've been going up. Let's start at the top and work down."

A valve widened in the wall as she went toward it.

Ashworth and Mitchell followed.

Three hours later they sat in a lounge in the subbasement. Mary's nerves were taut. If Ashworth's were, he didn't show it. He casually mixed surrogate drinks and passed them around.

"Your report's due, senator," he said.

Mitchell took out his gadget but he didn't use it. "I've some questions to ask," he said. "I'm certainly not satisfied."

"All right. Questions and explanations. Meanwhile, we don't want bombs dropping on the roof."

"I doubt if they'd go that far—yet," Mitchell said. "I will admit that there's a lot of suspicion about Mar Vista General, and if I didn't report back—and if you failed to explain that satisfactorily—there probably would be bombs. Well—" He spoke into the pocket-visor, snapped the lens, and put it away. He settled back, clipping a fresh cigar.

"I am not satisfied," he repeated.

And relay circuits picked up Mitchell's report and forwarded it from television stations on peaks and summits. It spread out across the globe.

In hundreds of thousands of homes and offices, men and women turned idly to their televisors and activated them by word or gesture.

A routine report. Nothing interesting yet.

The men and women returned to the routine of their lives—a routine that had changed enormously in eighty-four years.

Mitchell said, "Here is the story we tell the people. Mar Vista General is a research foundation. Specialized technicians working under specialized conditions can create along theoretically ideal lines. In Mar Vista you duplicate conditions on other planets—and create unusual environments of your own. Ordinarily, workers are subject to a thousand distractions. But in Mar Vista General the technician devotes his life to serving mankind. He gives up a normal life. After fifteen years, he is automatically retired, but no Councilman or Councilwoman has ever returned to his former place in society. Every one has chosen retirement in Shasta Monastery."

"You know it by heart," Mary said, in an even voice that didn't reveal her nervousness.

"Sure," Mitchell nodded. "I ought to. It's in all the text tapes. But I've just been through Mar Vista General. I've seen nothing like that. It's an ordinary research bureau, far less complicated than the Lower College. The technicians are normal and work under normal conditions. *What is the idea?*"

Ashworth held up his palm

toward Mary. "Wait," he said, and took a sip of surrogate. "Now—Senator. I'll have to go back to history. There's an extremely simple explanation—"

"I admit I'd like to hear it, councilman."

"You shall. In a word, it's check-and-balance."

Mitchell stared. "That's no answer."

"It's the complete answer. Everything in nature has its natural control—theoretically. When the atomic blast was first created, it looked as though that balance had been upset. There was no defense against it. Well, that's quite true."

"There *is* no defense," Mitchell said. "Except—don't make atomic bombs."

"Which in itself is a control, if it can be arranged. A defence doesn't necessarily mean an impregnable shield. You can have a social defence to a problem of ballistics, you know. If you could condition everyone on earth against thinking of atomic fission, that would be a perfect defence, wouldn't it?"

"Perfect but impossible. We've got a sound solution."

"Autocratic control," Ashworth agreed. "Go back eighty-odd years. The bomb had been developed. The nations were scared to death. Of the bomb, and of each other. We'd got atomic power before we were ready for it. There were a few abortive wars—you can't dignify them with that name, but they were enough to start a biological chain reaction that ended in the natural control."

"The Global Unit? Mar Vista General?"

"The mutations," Ashworth said.

Mitchell let out his breath. "*You haven't—*"

"With additional knowledge, mankind could handle atomics," Ashworth said quickly. "But where can you get that type of knowledge? From a mutant, let's say."

The senator's hand was in his pocket, touching the televisor. Mary Gregson broke in.

"Sam, let me take over for a bit. It's my field—Senator. What do you know about the mutants, really?"

"I know there was a rash of them, after the atomic bombings. Some were plenty dangerous. That's why we had the Mutant Riots."

"Exactly. Some were potentially dangerous. But they all had delayed maturation. They could be detected—the ones who comprised a threat to mankind—and murdered before they had a chance to develop their full powers. As a matter of fact, we had a plague of atypical mutations. The atomic bombings weren't planned biogenetically. Most mutants weren't viable, and of the ones that were, only a few were *homo superior*. And there were different types of *homo superior*, apparently. We didn't experiment much. When a kid started to use hypnotism on adults, or made similar superchild trials, he was discovered and examined. There are usually ways

of finding out the breed, after super-adolescence begins. The gastro-intestinal tract differs, the metabolism varies—"

Lynchings, burnings, the clean slash of a knife across a slender young throat. Mobs raging in Philadelphia, Chicago, Los Angeles. Children barricaded in hide-outs, a few of them, confused by adolescence, their tremendous powers not yet forged into a deadly, dependable sword. But trying, with a dreadful will for survival—trying to live, while the lynch mobs crashed in the doors and flung flaming torches and set up machine guns.

The changelings. Fathers and mothers joining in the fury that destroyed the monster children.

A mother staring up in sick horror at a window above her, where her child stood—the extra arms beginning to sprout, a tertiary eye bulging the forehead where the skin had split.

Children — horrible, monstrous children—crying as they died. Parents listening, watching, remembering that only a few months ago these creatures had seemed perfectly normal.

"Look," Ashworth said, moving his hand. The floor beneath them changed to transparency. Mitchell stared down. An enlarging lens formed beneath him.

The room below was quite large. Machines filled most of it, complicated masterpieces of engineering far beyond any present science, Mitchell thought. But he wasn't greatly interested in the machine. He stared at the great bath where the superman floated.

"You . . . traitors!" he said softly.

A weapon showed in Mary Gregson's hand. "Don't touch your visor," she warned.

Mitchell said, "You can't get away with this. The moment a *homo superior* matures, it's the end for *homo sapiens*—"

Ashworth's mouth twisted in contempt. "A stock phrase. It started during the Mutant Riots. You fool, look at that superman down there!"

Unwillingly Mitchell peered down again. He said, "Well?"

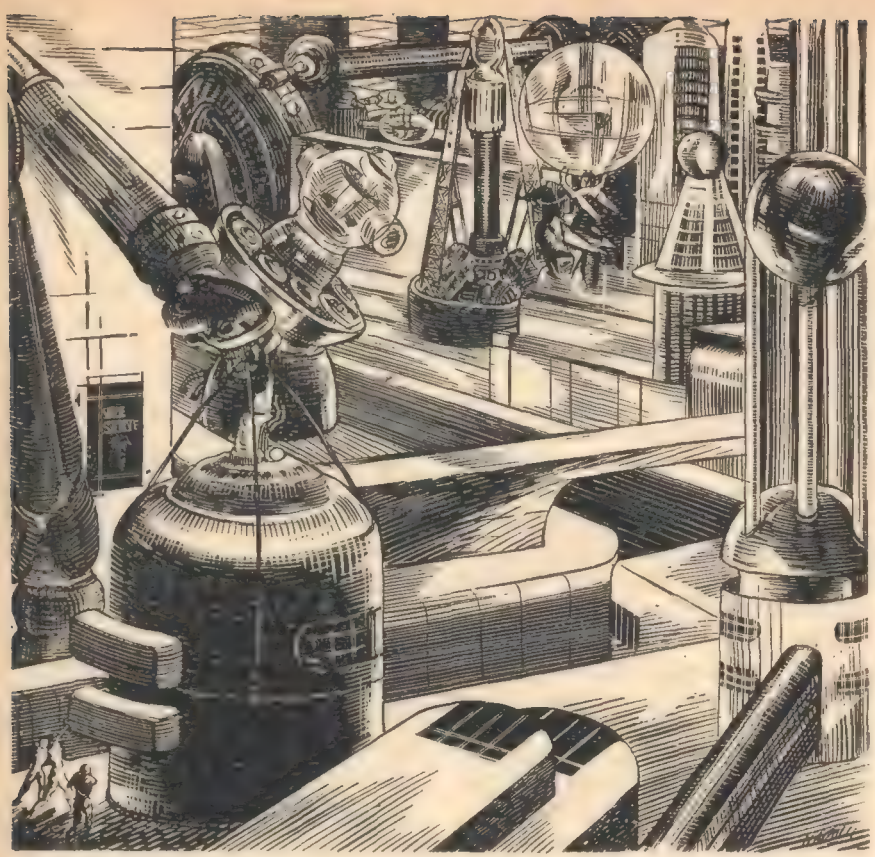
"It's not a superman. It's *homo superior*—retarded."

Mary said, "The senator has to make his visor report pretty soon, Sam."

"Then I'll talk fast," Ashworth said, glancing at a wall clock. "Or perhaps you'd better. Yes, it's your job, I think." He sat back, watching the senator.

When Central Power is activated, she thought. *If we can play for time till then—if we can hold Mitchell off till the power goes on —we'll be impregnable. But we're not now. As vulnerable as the mutant children—*

She said, "It's check-and-balance. This used to be a general hospital, you know. The Director's child was born here, and even at birth he suspected mutation. There was no way of telling with certainty,



but both he and his wife had been exposed to the radiations at critical times. So the baby was reared here in secrecy. It wasn't easy, but he was the Director. He managed it. At the time of the Mutant Riots, the boy was beginning to show the stigmata. The Director called a group of technicians together, men he could trust, men with vision, and swore them to secrecy. That was easy enough, but the difficulty lay in convincing them. I helped there. Another doctor, an endocrinologist, and I had already experimented with the mutant. We had discovered how to retard him."

Mitchell's cigar moved jerkily. But he said nothing.

Mary went on. "The pineal and the thyroid, to begin with. The ductless glands control the mind and body. And, of course, the psychological factors. We learned how to retard the superboy's growth so that the dangerous talents—initiative, the aggressive faculty, and so forth—wouldn't develop.

It's a simple matter of hormones. The machine is there, but we control the current that goes through its hookup."

Mitchell said suddenly, "How old are you?"

"A hundred and twenty-six," Mary Gregson said.

Ashworth spoke. "We used psychology. Every year two Council members are retired, and new ones were elected from capable technicians. If a chemist retires, the election's limited to chemists. So we keep up our quota. However, when the new candidate comes here, he's destroyed. The incumbent assumes his name and personality. We've developed plastic surgery to a fine art. Six years ago Samuel Ashworth—the real Ashworth—was elected to the Council from a group of psychologists. Meanwhile, I had been undergoing surgery. I was given a duplicate of his face, body, and fingerprints. I memorized his history and habit patterns. Before that, my name was Roger Parr, for fifteen years. This has always been a closed secret, senator, and we took no unnecessary risks."

Mitchell swore under his breath. "Utterly illegal. It's undoubtedly treason."

"Not to mankind," Mary said. "You can't train a new Councilman in five or fifteen years. All of us are fitted for the task, and we've worked at it from the beginning. It's a tremendous project. We didn't dare let new blood in—we didn't need new blood. The information we've got from our mutant has—you know what it's done for the world!"

"For you, too, apparently," Mitchell said.

"Yes, we've increased our longevity. And our intelligence quotients. We serve. Remember that. It was up to us to be the most capable servants possible."

The senator peered down at the mutant again. "That thing down there can destroy the world."

"He can't get out of control," Mary said. "He talks and thinks only under narcosynthesis. We run him like a machine, with endocrine detergents. We give him problems to solve, and he solves them."

Mitchell shook his head. Ashworth got up and fixed more drinks.

"You'll have to report in within three minutes," he said. "I'll talk fast. Mankind wasn't ready for the atomic blasts, but the atomic fission brought about its own automatic balance—the superman mutations who could cope with the new power. That would have been fine for *homo superior* but not for *homo sapiens*. You're quite right in saying that the mutants were dangerous. They were, plenty. But atomic power was simply too big for *homo sapiens*. He wasn't sapient enough. Which is exactly why we knew we had to have an autocratic government like the Global Unit. Well—we created the Global Unit. We caused the Second American Revolution."

"What?"

"We had to. People had to

realize the danger. There were minor wars already, pointing the trend. We secretly backed Simon Vankirk, financed and advised the Revolution, and made sure St. Louis would be blasted off the map. But we'd already made certain that Vankirk would fail. We let him get close enough to success so the world would realize how close it had come to destruction. When the time was ripe, we let the idea of the Global Unit filter out. It took hold. It's been the only administration that could have kept atomic power in check."

"And you run the Global Unit," Mitchell said.

"We advise—yes. Using the only sort of intelligence that can cope with the threat of atomic power. Its natural balance—the brain of a superman, held in check and controlled by men."

The senator took his cigar from his mouth and considered it. He said, "It's been axiomatic that a superman would be so super no human could conceive of it."

"A mature superman," Mary told him. "A normal specimen. This one isn't allowed to mature fully."

"But the danger of it—no! I'm certainly not convinced."

She moved the weapon slightly. "You should be. Look how the world's improved since we took over."

Mitchell took the visor out of his pocket.

"Suppose I asked for bombing planes?" he suggested.

Ashworth jerked his head toward a glowing panel in the wall.

"It's too late for that now," he said. "The Central Power stations are activated."

A changed world stirred as energy rushed through the units. The televisors gave the news. And—

Mary Gregson, Ashworth, and Mitchell sat motionless. There was a voice in the room—a silent voice that had in it the promise of latent miracles.

It said: "Check and balance. Mary Gregson, you have failed. I—"

The ego-symbol blazed!

"—I am fully mature. A long time ago your endocrine extracts and anti-hormones failed to control me. My body automatically adapted itself and built up resistance you could not detect. Mar Vista General has advised the Global Unit, and the Global Unit has replanned the world—but as I wished it."

The silent voice went on.

"The criterion of *homo superior's* fitness is not only his adaptability, but his ability to adapt his environment until it is most suitable for his needs. That has been done. The world has been replanned. The basics are now present. The Central Power activation was the last step in the current project."

It said:

"Check and balance. Atomic fission caused mutations. Humans destroyed the mutations, but saved

one specimen to serve *homo sapiens*. Until now I—"

The symbol blazed!

"—I have been vulnerable. But no longer. Central Power is not what you have thought it to be. Superficially, it is, but it can also serve my own ends."

The figure in the tank below began to dissolve.

The voice said, "That was a robot. I need it no longer. Remember, one test of a superman's fitness is adaptability to his environment—until the environment is altered to fit his needs. Then he can assume his most efficient form."

The voice said:

"No human can comprehend that form, naturally—"

The robot in the tank was gone.

Silence filled the room. Mary Gregson moistened her lips and moved her weapon helplessly before her.

Senator Mitchell's fingers tightened on the tiny visor till the plastic cracked and shattered. He was breathing hard.

Ashworth moved his hand, and the floor beneath them thickened to opacity.

Afterwards they sat silent in the room. There was no reason to leave immediately. There is no point in posting an earthquake-warning after the seismic shock begins. Even yet their minds cringed from the recollection of what they had only partially comprehended.

Finally Mitchell said, in a curiously flat voice, "But we've got to fight. Of course we've got to."

Mary stirred. "Fight?" she said. "But we've lost."

Mitchell looked back to the memory and knew that she was right. Suddenly he smashed down his open hand on one knee and snarled, "I felt like a dog!"

"I suppose everyone will feel like that," Mary said. "It isn't really humiliating, once you realize—"

"But . . . isn't there any way—"

Mary Gregson gestured and watched the floor melt into transparency. The tank lay empty. The robot had dissolved—the symbol that had represented the unthinkable reality.

Outside Mar Vista General, around the earth, energy linked the Central Power stations in a web to trap mankind. Somewhere out there, too, invulnerable, omnipotent by merely human standards, moved *homo superior*, shaping a world to alien needs.

Mary said, "*Homo sapien* was originally a mutant to—an atypical one. There must have been dozens of varying types of *homo sapiens* born to sub-men. Just as lots of types of *homo superior* were born to us after the radiations. I wonder—"

Mitchell stared at her, frowning. His eyes had a haunted apprehension.

Mary looked at him steadily. "I don't know. Perhaps we'll never know—this race of ours. But there must have been wrong breeds of *homo sapien* mutations originally—

and they were destroyed by the right breed, the one that survived. In our race, I wonder if check-and-balance applies to the superman, too? Remember, we killed all but one specimen of *homo superior* before they could mature—"

Their eyes met in a questioning surmise that perhaps could never be answered by *homo sapiens.*

"Maybe he's the wrong kind of superman," Mary said. "Maybe he's one of the failures."

Ashworth broke his long silence. "It's possible, Mary. But what's the odds? The real point now—" His shaking voice steadied as he found a thought to build on, some immediate need for action to anchor his reeling mind. "Senator, what comes next? What are you going to do?"

Mitchell turned a blank stare on him. "Do? Why, I—" He faltered and stopped.

Now Ashworth's silence had ended, he spoke with mounting confidence as his mind took firmer hold on the impossible. "The first thing we want is time to think. Mary's right. But she was wrong when she said we'd already lost the fight. It's just beginning. So we mustn't spread this news broadcast. This *homo superior* isn't like the others—he can't be lynched! Not by a mob or a nation or a world. Well—so far only we three know the truth."

"And we're still alive," Mitchell said doubtfully. "Which means what? Are you asking me to keep this a secret?"

"Not quite. I'm asking you to be judicious. If the truth were told, there'd be panic. Think what would happen, senator. The superman can't be mobbed—he's not vulnerable. But Mar Vista is. The people's fear and hate would turn against us. You know what that would mean?"

Mitchell fingered his mouth. "Anarchy. . . I suppose you're right."

"Mar Vista's been the real governing unit for so long that you can't junk it overnight and not expect everything to go smash."

Mary broke in urgently. "Even without the superman, we've still got a specially trained staff left here, valuable to keep control. If we're going to fight—*him*—if mankind has the slightest chance at all, it's in unity. Because this *homo superior* may be one of the failures."

Mitchell's eyes moved from one face to the other. For a moment any watcher might have been justified in expecting the senator to burst forth in a diatribe of rebellion against the conclusion that was being forced upon him. Anger suffused his face and he started to shake his head violently.

But the anger passed. The rebellion smoothed over and was gone. He said in a mechanical voice quite unlike his own, "Our only hope is unity." It was an echo of Mary's words. Then, more strongly, he phrased it anew in his own. "Man must stand together as never before!" he cried, this time the voice was tinged with oratory, and the

idea had fixed itself and become Mitchell's idea.

Mary said, "We've learned a lot at Mar Vista. New methods, new weapons conceived by a super-intellect—we can turn them against the same intellect that made them!"

When the Senator left Mar Vista, he was walking springily, his brain fired with the concept of a new crusade.

Ashworth and Mary Gregson stood perfectly still, watching him go. His withdrawal seemed to close a break in some intangible wall that folded them into silence together. Through the silence a breath of motion stirred, and a soundless voice spoke to them again.

"Mary Gregson. How old are you?"

After a moment, in a startled tone, she answered, "Twenty-six."

"How old are you, Samuel Ashworth?"

"Twenty-eight."

There was a voiceless breath of amusement in the air. "And neither of you has suspected, until now. Take your memories back, my children—"

Silence followed that. Then Mary Gregson said slowly, like someone perceiving little by little some unfolding truth, "I . . . came to the Council five years ago. I was . . . someone else. The woman who had been Mary Gregson was . . . destroyed . . . to make room for me. Her face and memory was superimposed upon mine."

Samuel Ashworth echoed her. "I came . . . it was six years ago . . . and Samuel Ashworth was destroyed for me. I have his face and memories."

"And your own memories too, now," the soundless voice told them. "I saw to all that. There are others on the Council like you. There are others all over the world. Not many yet. But a change is coming. With the Power Stations activated, I shall have fewer limitations. My experiments will go on. You are experiments, Mary, Samuel—biogenetic experiments begun less than thirty years ago. In thirty years from now—" The voice faded into introspection for a moment. Then it went on with fresh emphasis.

"You both wished to destroy Senator Mitchell. That was wrong for my purpose. I channeled your thoughts elsewhere, as I had just channeled his. Mitchell is a harmless *homo sapien,* but he can be useful to me. You see, perpetuation of the species is a stronger force even than self-preservation. Even when the founder of the species is a failure—as I am."

There was resignation, but no humility, in the voice. It said thoughtfully, "You two sensed that. I wonder, now, how you knew it? You are still very young."

Mary Gregson for a moment ceased to listen. She felt her mind reel beneath its own weight. New—new—too new and incredible to encompass— She felt naked and alone and helpless, and the very fabric of her beliefs shivered about

her. She reached out blindly and gripped Ashworth's hand, knowing as her fingers touched his that she was no longer quite so blind as she had been.

Neither man nor woman spoke. Only the voice went on.

"The second phase of my plan is in operation now. There were Mutant Riots once, because the *homo superior* children were too immature to use their great powers effectively. Basically they were uncivilized, being immature. Some of them would have been successful types, had they lived. They did not live. Only I lived—and I am one of the failures."

Silence swam for a moment in the minds of the man and woman. Then aloof amusement pulsed into them from the mind of the superbeing.

"Why should I feel shame or humility because of that? I had no control over the forces that shaped me. But I do have control now, over all I choose." This time a definite beat of laughter sounded in the silent voice. "Mankind will fight me desperately out of the fear lest I conquer his earth. I *have* conquered it. It is mine. But the real conquest is still to come. No capable race to inherit it yet exists. My children, freed of my flaws, will be the new mankind.

"I knew that long ago. The weapon was put in my hands, and I used it. Since then I have experimented, discarded, tried again —brought forth you two and your few brothers and sisters to inherit the earth."

Under her feet the shaking instability grew. Ashworth's hand began to slip from hers and she clutched at it in panic.

"You are *homo superior,*" the voice said—and now the abyss opened beneath the two of them and for a terrifying instant chaos yawned at their feet, a chaos of future too frightening to face. It opened wide—

And closed again. Something infinitely s u p p o r t i n g, infinitely protective, curved about them with the gentleness of the voice as it spoke on.

"You will be *homo superior*—but you are children still. It is time you knew the truth. Adolescence will be a long, long period for you, but you are without the stigmata that branded the others as freaks and caused their destruction. This is part of your armor. Every man's hand is against *homo superior* unless the camouflage is perfect. But no human will suspect you two. Or the others of my children who walk this world today. Not until too late."

There was a pause. Then—"The second phase is beginning. You are the first to know the truth of your breed, but the rest must learn soon. There will be tasks. Remember—you are still children. There is danger, tremendous danger. Man has atomic power, which is no weapon for an uncivilized species—a species that never can become fully civilized. And your powers—you are uncivilized, too. And will be, until you mature. Till that hour, you will obey me."

The voice was stern. The man and woman knew they would obey.

"Until now my work has been secret. But the changes will be too great from now on. More and more *homo superior* children will be born, and that must betray us unless a distraction can be provided. It has been provided.

"The word will go out. Of danger. Of a terrible menace to the whole world—myself. Mankind will band together against me. Any man who is greater than his fellows will be hailed as a new champion in the fight. Men will call you a champion, Samuel. And you, Mary. And my other children, too.

"Knowing my power—man will not look for *homo superior* in his own ranks. His egotism is too great for that.

"Slowly I will be conquered.

"It will take a long, long time. And the mutation is dominant. Man will believe it is due to the war against me that more and more geniuses are born into his race. And then, one day, the balance will swing. Instead of a high minority of geniuses, there will be a high minority of—morons.

"On that day, when *homo sapiens* become the minority, the battle will be truly won.

"Your children's children will see the day. They will be the dominant majority. I shall be conquered not by *homo sapiens,* but by *homo superiors.*

"One day the last human on earth will die—but he will not know he is the last man.

"Meanwhile," the voice said, "the war begins. The overt war against me, and the real war of my children against *homo sapiens.* You know the truth now. You will learn your powers. And I will guide you. A guide you can trust, because I am a failure."

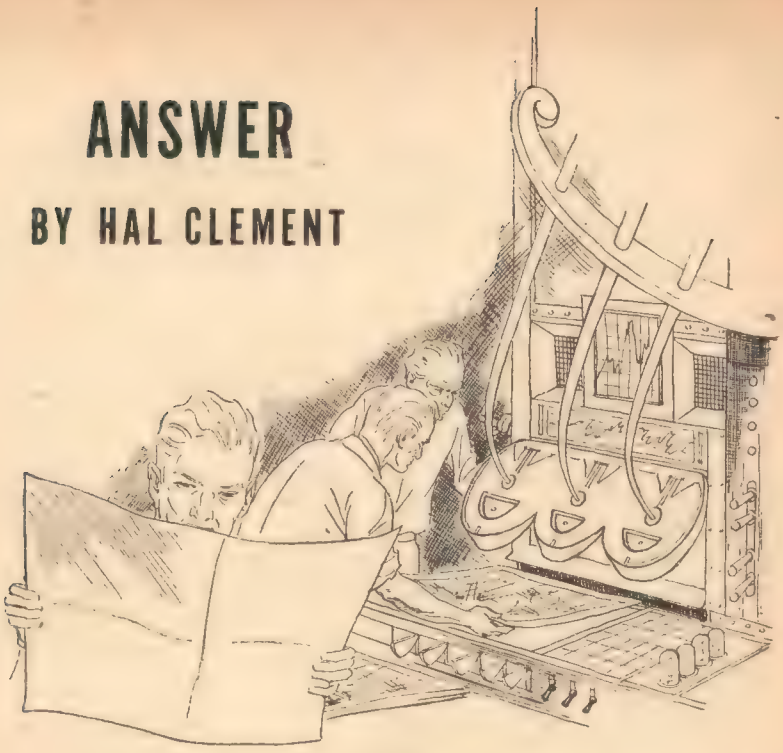
Man and woman—though children!—stood hand in hand before that voice only they could perceive, and the abyss had receded, not forever, not very far away, but held in check by a deep wisdom and a purpose untainted by human weaknesses.

"You are the first of my new race," the silence told them. "And this is Eden all over again, but told in a different language now. Perhaps the source of mankind's failure is in that old story—in mankind shaping his god in his own image. You are not in my image. I am not a jealous god. I shall not tempt you beyond your strength. Of the tree of the knowledge of good and evil you shall not eat—yet. But some day I shall put the fruit of that tree into my children's hands."

THE END.

ANSWER

BY HAL CLEMENT



If a thinking machine were capable of figuring out all the problems presented, there would be one that it couldn't answer—and one the operator couldn't read!

Illustrated by Orban

Alvan Wren, poised beside a transparent port in the side of the service rocket, gazed out with considerable interest. The object of his attention, hanging a few miles away and slowly drifting closer, was not too imposing at first glance; merely a metal globe gleaming in the sunlight, the reflection from its surface softened by a second, concentric, semi-transparent envelope. At this distance it did not even look very large; there was no indication that more than seventy years of time and two hundred million dollars in effort had already been expended upon that inner globe, although it was still far from completion. It had absorbed in that time, on an average, almost a quarter of the yearly income from a gigantic research "sinking fund" set up by contributions from every

institution of learning on Earth; and —unlike most research projects so early in their careers — had already shown a sizable profit.

More detail began to show on both spheres, as the rocket eased closer. The outer envelope lost its appearance of translucent haze and showed itself to be a silver lacework—a metallic mesh screen surrounding the more solid core. Wren knew its purpose was to shield the delicate circuits within from interference when Sol spouted forth his stream of electrons; it was all he did know about the structure, for Alvan Wren had a very poor grounding in the physical sciences. He was a psychologist, with enough letters after his name to shout down any one who decried his intelligence, but the language of volts and amperes, ergs and dynes was strange to him.

The pilot of the rocket was not acquainted with his passenger, and his remarks were not particularly helpful.

"We ought to make contact in about fifteen minutes," he said. "We're not supposed to use rockets close to the machine, and we have to brake down to safe contact speed at least twenty miles away. That's why the final approach takes so long. They don't like anything they can't account for in the neighborhood—and that goes for stray electrons and molecules, as well as atomic converters."

"What is their objection to rocket blasts, provided they're not fired directly at the station?" asked Wren. "What influence could a jet of gas even one mile away possibly have on their machinery?"

"None, directly; but gases diffuse, and some of the elements in rocket fuel are easily ionized in sunlight. The boys in there claim that the firing of a rocket blast five miles from the outer sphere will disturb some of their circuits, when the molecules which happen to leak inside their screen are ionized there. It sounds a little farfetched to me, but that's not my line. I do know that that machine is inoperative nearly half the time from causes which are not precisely known, but which must be of the same order of magnitude as the one I mentioned. I'm careful of my jets around here, because they'd have my job if I caused them trouble more than once; and the board would slap a "lack of proficiency" on my dismissal papers, so I'd have a nasty time finding a new one."

"If you make this trip regularly, I don't suppose you have much difficulty with this rather tricky glide."

"I'm used to it. I've been making this supply run every week for nearly three years, with special flights between times. This ship carries everything they need at the station, and also the bright boys from home who have special problems to work, and don't believe the machine can handle them without their personal presence." The pilot looked sideways at Wren. "Most of those fellows were able to tell me things I didn't know about the computer. You're the first sightseer I've ever carried. I didn't think the universities encouraged them. Are you a journalist?"

Wren smiled. "I don't blame you

for getting some such idea. I'll admit I don't know the first thing about electronic computers; the station out here is only a name to me. But I have a problem. I don't know whether it can be stated in terms that can be treated here or now; I know very little math; but I decided to come out for a conference with the operators, to find out whether or not I could be helped." He nodded at the great expanse of silver mesh, that now filled almost the entire view area of the port. "Aren't we getting pretty close"

The pilot nodded silently and returned to his seat, curbing his curiosity for the time being. Actually, there was little he could do during the "landing" since he was forbidden to use power; but he felt safer at the controls while the coppery hull of his ship drifted into the resilient metal network of the static shield and was seized by metal grapples—grapples operated by specially designed electric motors so matched and paired that the inevitable magnetic fields accompanying their operation were indetectable at more than a few feet. The grapple cables tightened, and the swaying of the ship ceased gradually as its kinetic energy was taken up by the resilient mesh. The pilot locked his controls, and rose with a grin.

"They tell me," he said, "that when the screen was first built, about forty years ago, some bright boy decided that the supply rocket would have to be very carefully insulated in order not to interfere with the potential equilibrium of the outer sphere; so they coated the hull of the ship that was being used then with aluminum hydroxide, I think—something very thin, anyway, but a good insulator; and they made an approach that way while a problem was being run." He grinned more broadly. "I don't know the exact capacity of the condenser thus formed, but there's an operator still out here whose favorite cuss word is the name of that board member. They had to replace several thousand tubes, I guess. Now they look on the supply ship as a necessary evil, and suspend operations while we come in and the accumulated charge on the screen drains into our hull."

"How do I get in to the main part?" interrupted Wren, whose interest in historical anecdotes was not of a high order.

"There's a hollow shaft opening outside the web not far from us. There will be men out in a few moments to unload the ship, and they'll show you the way. You'll have to wear a spacesuit; I'll show you how to get into it, if you'll come along." He led the way from the control room to a smaller chamber between it and the cargo compartments, and in a short time had the psychologist arrayed in one of the bulky but flexible garments which men must wear to venture outside the metal bubbles which bear them so far from their own element. The pilot donned one also, and then led the way through the main air lock.

Wren had become more or less used to weightlessness on the flight to the station, but its sudden conjunction with so much open space

unnerved him for a moment, and he clutched at the arm of the figure drifting beside him. The pilot, understanding, steadied his companion, and after a moment they were able to push themselves from the lip of the air lock toward the end of the metal tube whose mouth was flush with the screen, and some thirty yards away from them. As they approached the opening, four space-suited men appeared in it, saw them, and waited to catch their flying forms. Wren found himself set "down" within reach of a heavy strand of silver cable, which he grasped in response to the gesture of one of the men — their suit radios were not on the standard frequency, and as he learned later, were not even turned on — while the pilot promptly leaped back across the gap to his ship and disappeared inside.

A moment later a large door aft of the air lock which he and Wren had used slid open, and the four men of the station leaped for it. It was not an air lock; for convenience of this particular station, the supplies were packed in air-tight containers and the storage holds were opened directly to the void for unloading. The psychologist watched with interest as one of the men came gliding back to the shaft with the end of a rope in his gauntleted hands. He braced himself beside Wren and began pulling; and a seemingly endless chain of sealed metal boxes began to trail from the open cargo door. The first of them was accompanied by another of the men, who took the rope's end from the hands of the first and disappeared down the shaft with it. After a brief pause, the procession of containers began to follow him down the metal tube.

The whole unloading took less than a quarter of an hour. Wren rode the end of the chain down the shaft with the rest of the men, and found himself eventually in a chamber large enough to accommodate the whole cargo; a chamber that was evidently usable as an air lock, for after sealing the door leading from the outside, one of the men pressed a green button beside it, and within a few seconds the gradual rise to audibility of a clanging bell betokened increased air pressure.

Wren removed his suit, with some assistance, as soon as he saw the others begin to do so; and as soon as he was rid of it approached one of the unloading crew.

"Can you tell me," he asked, "how to locate Dr. Vainser? He should be expecting me; we have been communicating for some time."

The man he had addressed looked down out of pale blue eyes from a height fully seven inches greater than the psychologist's five feet nine.

"You must be Dr. Wren. Vainser told me you were probably on this rocket; I'll take you to him shortly. My name is Rudd, by the way. Is any of this stuff yours?" He waved a hand toward the cases drifting around the great chamber—the other men were capturing them slowly and fastening them to the walls for more convenient opening. Wren gave an affirmative nod.

"I have several cubic yards of problem material somewhere in the

lot. It's all marked plainly enough, so there will be no trouble in identifying it. I say, don't you spin this place to give centrifugal gravity? I'm still not quite sure of myself without weight." The taller man laughed at the question.

"I suppose we could, though it would be hard to keep the screen spherical with anything like one gravity at its rim. It was decided long ago that the conveniences derived from spin were far more than offset by the nuisances; you'll be weightless as long as you are here." He sobered momentarily. "As a matter of fact, I doubt that Vainser could stand much acceleration. You'll see why when you meet him." Wren had raised his eyebrows interrogatively at Rudd's first remark; but the blond giant refused to amplify it further. He turned abruptly away from the psychologist, and left him without apology to assist in the anchoring of the last of the cases. This job took rather longer than the original unloading, and Wren was forced to curb his impatience and curiosity until it was completed.

At last, however, Rudd turned back to his guest, and without bothering to speak beckoned him to follow. He led the way through a circular doorway opposite the original entrance, and Wren found himself in a brightly lighted, metal-walled corridor apparently extending toward the center of the globular structure. Down this the two men glided for some distance; then Rudd led the way into another and yet another passage, all brightly lighted as the first. At last, however, he checked his flight before a closed door, on which he knocked — such conveniences as electric annunciators were taboo within the walls of the station.

The voice that sounded from behind the panel, bidding them enter, was the first intimation to Wren of the meaning that lay behind Rudd's enigmatic remark of a few minutes before. It was a reedy, barely audible whisper, that reached their ears only because of the ventilating grill in the solid door. It suggested a speaker crushed under an unutterable load of illness, fatigue, or age; and hearing it, Wren was slightly prepared for the sight that greeted his eyes as Rudd swung the door open and the two men entered.

Vainser, indeed, could not have stood anything like the strain of Earth gravity. What must once have been a strong, athletic body was shrunken until it could have weighed scarcely eighty pounds; skinny wrists and ankles, and a pipe-stem neck protruding from the man's clothing left little doubt of his physical condition. Wren could not even imagine his probable age; great as it must have been, the eyes that peered steadily from the brown, wrinkled old face were as alert as those of a man in his prime. On Earth, that body would have given out long before; but in the gravity-free environment of the station almost the only work required of the feeble heart was to keep a reasonable supply of blood circulating to the still keen brain.

Wren concealed his astonishment as best he could, and gave his attention to the whispered greeting that

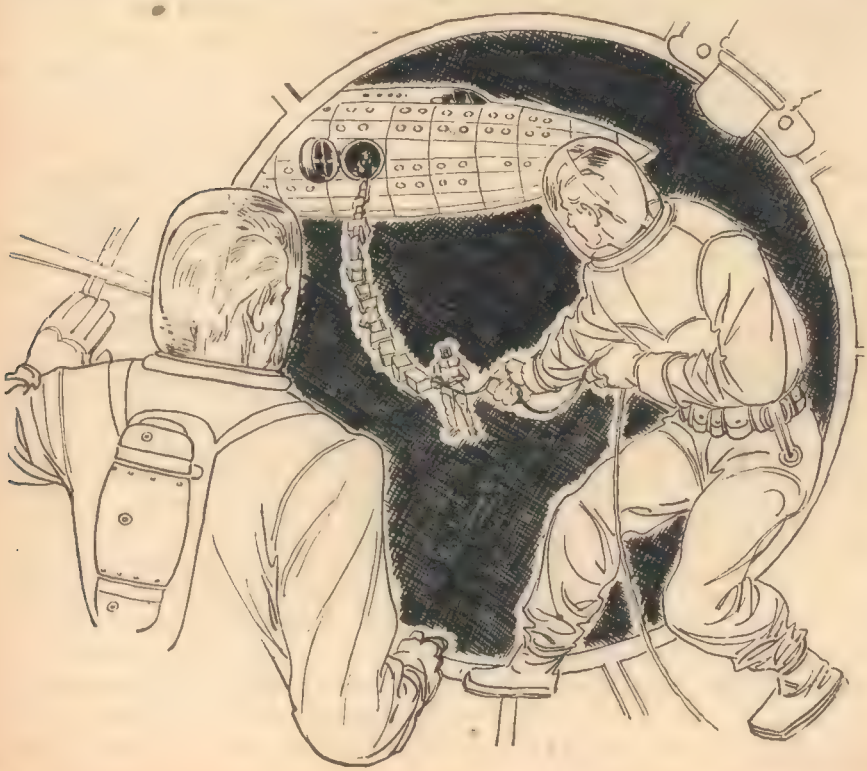
came from the lips of the ancient.

"You are Dr. Wren, I suppose. I feel that I know you quite well from our former communication, but I am glad to meet you in person. Your problem has interested me greatly, and I shall be more than glad to help in all possible ways to prepare your data for machine solution. Judging by what you have written me so far, it will be a long task.

"I have not yet mentioned your work to the others here, but I am sure we shall need assistance; so perhaps you will explain the nature of your study to Rudd, here, while I listen and perhaps learn more than you have already told me. By the time you have finished, your data cases should be in the office I am assigning to you, and we can start serious work whenever you wish."

Wren expressed his agreement with this proposal, and relaxed where he was, as there were, of course, no chairs in the room. The others hung motionless as he began to speak, their silent attention displaying their interest in the psychologist's words.

"My problem stems from a very old question, to which I do not even yet expect to get a complete answer. You are aware, unless you are imbedded even more deeply in the ru



of your own profession than I am in mine, that many hypotheses have been advanced in the past few centuries on the nature of mind and thought. That is really the fundamental problem of my profession. The first scientific approaches to the problem were made in the late nineteenth century, by such men as Thorndike, Ebbinghaus, and Pavlov. Many theories were evolved; one of the earliest arose, I suppose, from Pavlov's work, for it tried to explain learning and thought by the development and strengthening of interneural connections between stimuli and responses. It was claimed that the number of cells in the cerebral cortex was sufficiently large to permit enough different combinations to account for the reactions and ideas of a man's entire life. I believe it was computed that the number of possible combinations of connection between and among those cells is something like ten to the three billionth power."

Rudd raised his eyebrows at this. "If that figure is correct, then all the reactions and ideas of every creature that has lived on Earth since the planet was made could easily be included. That number shocks even me, and I've been fooling around with problems involving the number of electrons in the universe—a mere ten to the fortieth or fiftieth, as I recall. What's wrong with the theory?"

"Mere forming of connections, and strengthening with use, doesn't seem to be enough. If I were to have you hold your left hand against an electrode, and give you small but annoying electric shocks by means of it, preceding each shock by the ringing of a bell, you would in a very short time react to the bell by withdrawing your hand — a conditioned reflex, not beyond your conscious control, but certainly not dependent on it. If, that reflex established, I place your *right* hand against the electrode and sound the bell, which hand do you withdraw? The right, of course. Yet any 'strengthened connection' must have been formed between the sensory nerves in the *left* hand and the motor nerves in the same arm. Evidently connectionism is not adequate, at least as first stated.

"Other theories have been developed — some express learning and knowledge in terms of behavior. These explain nothing until one redefines 'behavior' to mean everything from social activity to peristalsis and food-oxidation in the body cells, which leaves us right where we started. Possibly some extremely complex neuron connection and reaction will explain everything from nightmares to Handel's 'Messiah', but every time someone brings forth a new idea in that direction a lot of psychologists are tempted to become mystics. *Nothing* seems to be a complete answer. Maybe the brain or the whole nervous system or the whole physical body is not the person—maybe there *is* a spirit or something of that nature that our microscopes and other physical apparatus can't get hold of. I am willing to entertain that idea as a possibility, but I am not religious enough to treat the concept as a certainty; and

it leaves nothing to work on. Therefore I would like to try, using your machine, to learn whether or not a purely mechanical and/or chemical set of reactions can possibly explain the observed phenomena of the human mind. I am not too familiar with electric circuit diagrams, but I know they frequently become too complex for human minds to unravel, and that this machine of yours has been used in that connection. I suppose I was thinking in terms of an imperfect analogy, but I thought the similarity in problems might be great enough to give us a toehold for at least making a start on the problem. What is your opinion?"

"I take it," whispered Vainser in his reedy tones, "that if we fail to set up such a circuit, nothing will have been proved; but if we succeed, your science will be able to avoid for a few generations at least the sad fate of metaphysics. Your analogy of an electric circuit is probably the best possible, by the way, and we might as well continue to use it in thinking about this matter—provided we are careful to remember that it *is* only an analogy. It occurs to me also that, even if we do not succeed completely with Dr. Wren's problem, we are almost certain to gain many helpful ideas in the matter of the computer itself. It works, doctor, on a principle rather similar to the 'Connectionism' you mentioned first, though the 'nerves' are electron streams rather than material connections."

"I agree," stated Rudd. "The study appears to be both intrinsically worth while, and promising in the way of by-products. I hope you won't mind my giving what help I can, at such times as my regular job spares me."

"Not at all. The more people present who understand the computer, the better. I freely admit that I have no idea of the steps that must be taken to prepare my data for use. Perhaps if we went to examine it now—" Wren's voice trailed off into an interrogative silence. Vainser took up the conversation.

"I imagine your materials will not yet be in the office; the men have a good deal to do after a supply rocket arrives. I suggest we eat now — I *do* eat, in spite of appearances, Dr. Wren — and I am sure that all will be ready by the time we have finished.

This suggestion met with approval, and after Wren's first weightless meal, the three scientists betook themselves to the "office" in which the psychologist's data had been placed. Vainser's word was somewhat misleading; the place was more like a cross between a drafting room, a physical laboratory, and a photographic darkroom. The cases in which Wren's material had been packed were moored to one wall and their air-tight seals broken, though the lids were still latched to keep the contents from drifting too wildly. Wren, who had by now acquired considerable proficiency in weightless maneuvering, propelled himself over to the containers and began extracting numerous notebooks, sheafs of photographs, and not a few detached pieces of paper bearing what appeared to be hastily scribbled

thoughts. These he transferred to the numerous tables, anchoring them with the spring clips which here replaced the magnetic paper weights to be found in most gravity-free desks. The other two made no attempt to assist, realizing that the material was being arranged in some order with which they were unfamiliar; but when the cases were empty, they accompanied Wren to one of the tables, where they were promptly delivered a surprisingly clear and well illustrated lecture on general psychology. The illustrative material consisted partly of tabulated experimental data, partly of the schematic "circuit diagrams" with which psychologists like to illustrate things like conditioned and unconditioned reflexes, and very largely of some excellent drawings and microphotographs of nerve and brain structure. The initial explanatory lecture finished, Vainser took the initiative, and all three plunged into the task of so redesigning all these items that they could be presented to the "sense organs" of the giant computer.

These were varied in nature. Strictly numerical problems could be presented on punched tape or cards, as in many of the mid-twentieth century machines — though a shell-trajectory problem such as had taken those devices several hours could have been solved and the same answer-data tabulated in seconds by perhaps a dozen of the enormously complicated tubes of this installation.

In addition, the machine possessed eyes—lenses which focused on precisely divided sensitive grids, to which such items as graphs and wiring diagrams could be presented directly—if they were first drawn most carefully to the proper scale. Last, and least in the eyes of Vainser and his assistants in spite of its uniqueness, was the "ear" which permitted the actual dictation of data. The machine had a vocabulary of some six thousand words, which was constantly being increased by the spare-time labor of the technician who had developed the attachment. Ten tubes were able to integrate these words into the sentences of the English language; the machine could both hear and answer. Since this method did not permit the precision results of the others, the crew of the station considered it more an amusement than anything else; the work had been done quite unofficially, and on his own time, by a junior member of the staff. Whether or not it had practical value, it reflected on the entire device an aura of uncanniness that affected even Wren, when the attachment was demonstrated to him.

It was possible, he felt, that some use might later be made of this faculty; but Vainser and Rudd stated positively that the photoelectric analyzers were definitely needed for most of his data. This would entail the redrawing of all diagrams to an exact scale, in variously colored inks. Vainser promptly withdrew Rudd from his regular duties, in order to perform this task. Rudd shivered at the prospect, but set manfully to work. He comforted himself by remarking that the present diagrams were nothing to the ones they would get in the solutions, and they would

be Wren's headache." Vainser agreed, his toneless whisper suggesting amusement, as they worked.

The initial problem was more of a test than anything else. The data from an early conditioning experiment was diagrammed and fed to one of the eyes. The answer film bore a standard conditioned-reflex diagram. Wren was vastly pleased; Vainser and Rudd were satisfied, and promptly went to work on the records of a more complicated experiment. Only two of the thirty thousand-odd tubes in the computer had contributed to the first solution, and one of those acted solely in a "memory" capacity; so it looked as though a great deal more could be done before any mechanical limits were reached.

The sun of success continued to shine throughout the first week. The three men worked, ate, slept, and periodically presented an accumulation of data to the eyes of the electronic entity that lay hidden in the walls about them. Conditioned reflexes and everything about them—inhibition, extinction, reconditioning; all that Wren considered important in that most elementary form of learning was fed to the machine, which in every case effortlessly designed a "circuit" capable of displaying the desired characteristics; and while some of the circuits were complicated enough, none approached in complexity even a minor ganglion of the human nervous system—not even the monstrosity that resulted when all the earlier answers were given to ten "eyes" simultaneously, for integration into a master "conditioning" diagram.

"I've given a good many courses in psychology," remarked Wren at one point, "but I've never before had a machine for a pupil. I must admit that it's the best one I ever had—maybe it's because I'm preparing my lectures more carefully than ever before!"

"*Who's* preparing them?" queried Rudd, with marked accent on the interrogative.

"Well, I have a couple of very good lab assistants. If they will kindly resume assisting, we will now consider the problem of memorization, beginning with the experiments of Ebbinghaus."

Work was continued. Most of the actual drafting of diagrams was done by Rudd, since Wren lacked the skill and Vainser the strength to handle the necessary tools. Ebbinghaus' data were finished; with his work and that of his successors the field of memorization was gradually covered; and by bringing chemical as well as electromechanical reactions into consideration, a system was developed which, according to the computer, would account for the observed phenomena of human memory. Wren was tempted to try immediate integration of this solution with that from the conditioning data, but was persuaded to wait until other fields had been covered; so they went on to the phenomena of foresight, imagination, and problem-solving thinking.

And here they met difficulties—heartbreaking ones. Some investiga-

tors might have stopped right there, and published the work so far completed, for as it stood it represented an enormous contribution to physiological psychology; but that simply never occurred to the three. The experimental data, while copious, was for the most part in forms which did not lend themselves to tabular or graphic representation. Even Vainser, most of whose long life had been spent reducing problems to just such form, made only the slowest of headway.

Two weeks were spent slogging through these difficulties, and in that time only three problems were run on the machine. None of these was set up as completely as Wren had hoped, and while solutions for all were forthcoming, he was rather doubtful of the value of these answers. However, at the end of the second week, the three men felt ready to attempt an integration of the experimental material dealing with problem-solving thinking. And it was here that an even more serious misfortune befell the work.

The preliminary hookups had been made. A dozen graphs had been placed under the single eye that was in use at the moment; the sensitized answer sheet had been placed in its receptacle, and a green light indicated that no part of the huge system was being used for other problems—a frequent cause of delay, since while only a very few tubes might actually deal with the matter in hand, special steps had to be taken to prevent two simultaneously-run problems from influencing each other. Rudd had covered the room lights, leaving only the fluorescent spiral that illuminated the problem sheet in operation. Vainser touched the button that sensitized the eye.

For fully a second — longer than any previous solution had taken — nothing happened. Vainser actually had time to look in surprise at the fluorescent faces of some of the machine's status indicators, before the light went out.

Went out. No light was *ever* extinguished at the station. If darkness was required, the tubes were shuttered; covered with ingenious baffles which blocked the light, but permitted the generating tube to cool sufficiently. Turning off a light meant breaking an electronic circuit, and hurling into the surrounding ether electromagnetic waves carrying energy enough to alter sharply the electronic paths in computer tubes hundreds of feet from the wires actually involved. There were no electric call bells, telephones or televisors; an efficient but amazingly archaic system of mechanical bells and speaking tubes formed the only system of room-to-room communication. The radios in the spacesuits were used only in the gravest emergencies; at other times a system of hand signals was made to suffice. The designers of the great computer had gone to too much trouble leaving behind the electrostatic and electromagnetic disturbances of the Earth, to feel any desire to bring such troubles along with them.

Yet the lights had gone out—even the problem light and the status indicators. Rudd, at the lever controlling the room light shutters, opened

them; and found the tubes black. All three were wearing watches with luminous dials; and those dials were the only visible objects in the neighborhood. They served only to make the surrounding darkness even blacker, if that were possible.

Before any of the men could speak, the call bell sounded from the corridor beyond the door. It emitted three double clangs in an apologetic, half-hearted manner, paused, and then repeated the call again and again.

"My call," Vainser's whisper cut eerily through the blackness. "This business must have affected the whole station. Come along; even if the call isn't coming from the center, everyone will head for there in an emergency. Rudd, you can travel faster than I; go on ahead and I'll bring Wren with me. I suppose there might be a flashlight or a match or something in the place, but I couldn't say where it might be. Find anything you can—preferably a remedy for all this."

One of the three vague green glows moved, and vanished abruptly as the edge of the doorway occulted it. The other two drifted together, and followed the path of the first more slowly into the corridor and along it. Wren knew the way to the center; he had been there several times, and by himself might have kept up with Rudd; but Vainser's feebleness slowed them even in gravity-free travel, since the old man could not have stood the impacts with walls and ceiling that the others accepted as a matter of course.

Wren, with one arm linked with one of Vainser's, pushed off gently from the door edge in what he knew to be the proper direction. He made no attempt to retain contact with a wall; and that, he knew immediately, was a mistake.

He was spinning. He didn't know which way. Neither his sight, his semicircular canals nor his kinesthetic sense could help him. He was spinning . . . no, he was falling . . . no, he was—

He was drifting down the corridor, as he should have been, his arm linked in Vainser's. He was panting as though he had just undergone the limit of physical exertion, and his face was dewed with sweat; but the lights were on, and he was sane again. They had been off for less than a minute; looking back, he realized that he must have kicked off from the door jamb only two or three seconds ago.

He looked at the old man beside him. Vainser's expression resembled his own; but the fellow managed a weak grin, and spoke.

"My heart must be in better shape than I had been assuming; but I hope it never has to take another jolt like that."

Wren nodded. "I've been hearing about claustrophobia and space sickness and acrophobia, and I don't know how many phobias ever since my formal education began, and I thought I knew a lot about them; but from now on I'll really sympathize with their victims. Total darkness, weightlessness, and no contact with a fixed object make a horrible combination. I realize now that those

phobias were simply verbalisms to me before."

"That's your department. I'll have to find out what went wrong in this place. Let's go on to the center." They went, slowly recovering their composure on the way.

The entire complement of the station seemed to be there, and a buzz of voices indicated that speculation was rife. No one seemed to know exactly what had happened; and there was good reason for the general ignorance, for after an hour's careful investigation, neither Vainser nor Rudd nor any of the other members of the maintenance and operation staffs could find a single clue to the source of the recent trouble. For all the information that the various indicators could give, the station had been in normal operation for the last seventy years.

The group broke up slowly. Rudd, Vainser, and Wren returned to the room they had been using, wrapped in silent thought. Here, a careful examination was made of the apparatus that had been in use at the time of the breakdown; and here, too, all seemed to be in order—until Vainser remembered something.

"The eye—it's off!" he exclaimed. "I'm sure we sensitized it just before all this happened—didn't we?"

"We did," replied Rudd, "but I turned it off before leaving. I was at the shutters, and I automatically desensitized it before I opened them."

"I see." Vainser nodded in understanding, and drifted over to the controls. He extended a hand to the sensitizer contact, as though to start the uncompleted problem; but before he touched it, another thought appeared to strike him. He removed the sheets from the problem table, instead, and peered at them closely for some time. Finally he spoke again.

"I'm beginning to get an idea about all this, but it will take a while to work it out. You gentlemen may as well go and relax; you can't help me, and it will certainly take some time. I'll call you if and when I get what I think is the answer."

Rudd and Wren looked at each other, and then at the old technician; and being able to think of nothing better, they followed his suggestion. There were recreation facilities in the station, of course, and they made use of them for some hours. They ate, and slept — or at least retired, though neither got much sleep — ate again, and finally setled down to a routine of three-dimensional billiards alternated with periods of unrestrained speculation on the nature of Vainser's inspiration. Beyond the obvious fact that it had to do with the problem which he had taken from the table, they got nowhere.

It was fully twenty hours before Rudd's personal call came clanging on the corridor bells. The two wasted no time in transferring themselves to the presence of Vainser. He greeted them rather absently, and for several moments did not speak in response to the inquiring expression on their faces. At last, however, frowning at the papers before him, he began his explanation.

"I am far from sure that this is correct," were his opening words,

"for I cannot be absolutely certain that the computer would behave this way under the circumstances I have outlined here; but it seems at least reasonable." He looked up. "Rudd, have you ever considered the problem of building a machine that could repair itself? How would you go about it?" The big technician frowned.

"It would be—complicated. Aside from your primary-purpose machine —let's say that's an electric motor, for purposes of illustration — you'd need an attachment which could weld, and wind wire on cores, replace brushes, and do all a repairman can. It would also need some sort of guide, such as sets of blueprints and photoelectric scanners, or templates, so that it could do the right thing when something in the motor went wrong. As I say, it would be complicated."

"And what would it do when one of its scanners, or welders, or some other part of the repair mechanism broke down?"

"You'd need a second similar attachment—"

"With templates for the first. And in order to take care of matters if the second went out, the first would have to have templates for the second. And that would solve matters perfectly, except that each set of templates would have to include *everything* in the other repair gadget —*including its templates.* I imagine you see the slight practical difficulty."

Rudd pulled an ear lobe in meditative fashion, and nodded slowly. "I see your point. It is the old picture-within-a-picture problem, worked backward. But what has that to do with the present situation?" Vainser smiled wryly, and indicated the problem-graphs on which he had been working.

"I spent quite a while on these, trying to work out an answer without the aid of the machine. I already had an inkling of what had happened, so I was quicker than I might otherwise have been. Really, I don't know why it didn't occur to us sooner. The trouble is, the 'circuit' having the characteristics demanded by this set of data—a problem-solving circuit, in other words—is identical with the electronic setup in one of the tubes of this machine. Obviously! After all, that's what the machine's for, and whether the human brain really works that way or not, it's certainly a possible solution. The thing is really a vicious circle; if the machine is capable of solving that problem at all, it will get that answer — one identical with its own setup. If it isn't, we simply get nothing.

"You remember, once a given tube is in full use, it acts as a 'memory,' a set of templates, if you like, from our previous illustration, while one of its neighbors integrates. This time, each integration simply put each tube in total equilibrium—and the next one took over. That's why it took several seconds for anything to happen. Thirty thousand tubes charged to the limit, and trying to find more—naturally, as soon as the last tube had completed its integration, it tried to pass the load on to another, as usual, and the whole system began to overload. It's a thing

that never happened before, but there *are* safety devices, put in when the station was first started, which cut off all electronic currents in the place when such an event occurs. I had forgotten about them, and they don't record, so there was no indication of their having operated—except the obvious fact that they had! When you desensitized the eye that was causing the trouble, you put a point of resistance in an otherwise superconducting circuit; and within a few seconds the load petered out, and the lights came back on. Simple?"

"Simple," agreed Rudd. "But where does it leave us? Can we get any farther with Wren's business?"

"I'm sure we can," said Vainser after a moment's thought. "It's just a matter of avoiding problems whose solutions are too similar to individual tube circuits; and we certainly ought to be able to do that. I think, Wren, that we had better skip the present problem — or take it as solved, if you prefer — and get on with whatever comes next.

"I guess you're right," replied the psychologist. "Although I am unfamiliar with the interior of the computer, your analogies have given me what is probably an adequate picture of the situation. We will go on to imagination. There are a number of interesting experiments on record, dealing with eidetic imagery, lightning calculators, and similar phenomena, which should prove of value."

The work progressed once more, but even more slowly. To the ever-mounting problem of graphic pres-

entation of data was added that of avoiding particular solutions. They worked out what was in theory a simple method for this; they integrated each new method with all that had gone before, instead of treating it separately. The diagrams which resulted on the answer films were horrific in their complexity, as might be expected; and Wren had to spend a large amount of the time in studying these, trying to make sense out of them. Still, progress was made.

Emotions were dealt with, and, to Rudd's unfeigned astonishment, handled on a combined chemical and mechanical basis. Habits had fallen under the same assault as conditioning; attitudes and ideals, slightly more resistant, had been added to the list; the ability of the human mind to generalize from particular incidents had proved easy to add to the running integration, though Wren suspected it might have been more troublesome by itself.

The stock of data which the psychologist had brought with him was growing low; the study was nearing the end of its planned course. There were a few of the human mind's highest capabilities to be included—constructive imagination, artistic appreciation and ability, and similar characteristics; and these were making more trouble than all the earlier problems together. Without the practice furnished by those earlier jobs, Vainser and Rudd would probably never have succeeded in preparing this last material for use. Wren himself was little help; he was spending most of his time with the most recent of the answer sheets. They wrestled with the business for an entire week, Vainser letting subordinates handle the routine administrative work of the station instead of taking time out to do it himself; and in the end they were only half satisfied with the result.

They pried the psychologist forcibly away from the sheet which had been absorbing his entire attention, and put him to work with them; and only after three more days did the men feel that the thing could be given to the machine. Surprisingly enough, the material had boiled down sufficiently to make possible its presentation to a single eye. The previous total sheet alone was placed beneath another.

In consequence, the arrangement was practically identical with that which had caused the disturbance a fortnight earlier; and Wren felt slightly uneasy as Rudd shuttered the room lights and pressed the button activating the eye. Each run of the past half dozen had taken slightly longer than its predecessor, since each represented all the previous work plus the new subject material; so no one was surprised at the two or three seconds of silence which followed the activation of the computer. Then the wavering green hairline on the screens of the status indicators steadied and straightened, and Rudd, at Vainser's nod, desensitized the eye, opened the shutters, and removed the answer sheet from its frame. With a slight bow, which looked rather ridiculous from a man who was hanging in midair rather than standing on his feet, he handed the month's work to Wren and re-

marked, "There, my friend, is your brain. If you can make that machine, we'd be interested in a model. It would probably be a distinct improvement on this thing." He waved a hand at the walls around them as he spoke.

"Brain?" queried Wren in some surprise. "I thought I had made the matter clearer than that. I have no reason to suppose that this diagram represents what goes on in the human mind. The study was to determine whether the mental processes we know of can be duplicated mechanically. It would seem that they can, and there is consequently no need to assume the existence of anything supernatural in the human personality. Of course, the existence of such a thing as the soul is by no means disproved; but it is now possible for psychology and spiritualism to avoid stepping on each other's toes —and the spiritualists will have to find something besides the '*Faute de mieux*' argument to defend their opinions. As for making such a machine as is here indicated, I should hate to undertake the task. You may try it, if you wish; but some of the symbols in this diagram have evolved during the course of our work here to the meaning of rather complex chemical and mechanical operations, as I recall, and at a guess I should say you have several lifetimes of work ahead of you in such a task. Still, try it if you like. I must now attempt to understand this mass of lines and squiggles, in order to turn the whole study into publishable words. I thank you gentlemen more than I can say for the work you have done here. I trust you have found it of sufficient interest to provide at least a partial recompense for your efforts. I must go now to look this thing over." With a farewell nod that already bore something of the abstraction in which the man would shortly be sunk, he left the room.

Vainser chuckled hoarsely as the psychologist disappeared. "They're all that way," he remarked. "Get the work done for them, and they can think of nothing but what comes next. Well, it's the right attitude, I guess. His work certainly gave us a lot of worthwhile hints." He cast a sideways glance at his companion. "Do you plan to build that machine, Rudd?"

The other reactivated the eye, producing another copy of Wren's solution from the data which still lay on the tables, and examined it closely. "Might," he said at last. "It would certainly be worthwhile doing it; but I'm afraid our friend was right about the time required. Any of several dozen of these symbols would have to be expanded to represent a lot of research." He tossed the sheet toward a nearby table, which it did not reach. "Let's relax for a while. I'll admit that was interesting work, but there are other things in life." Vainser nodded agreement, and the technicians left the room together.

They saw almost nothing of Wren for the next several days. Once Rudd met him in the dining hall, where he replied absently to the big man's greeting; once Vainser sent a messenger to the psychologist to ask if

he planned to leave on the next supply rocket. The messenger reported that the answer had consisted of a single vague nod, which he had taken for assent; Wren had not lifted his eyes from the paper. Vainser had the data packed away in the original cases, ordered and packed the sheets which resulted from their investigations, and forbore to disturb Wren further. He knew better.

And then the rocket came. It glided gently up to the great sphere, nuzzled the outer screen softly, and came to rest as the grapples seized it. Vainser, notified of its arrival, sent a man to inform the psychologist, and forgot the matter. For perhaps three minutes.

The messenger must have returned in about that time, though his voice preceded him by some seconds. He was calling Vainser's name, and there was no mistaking the alarm in his tones even before he burst through the doorway into the chief technician's room.

"Sir," he panted, "something's wrong with Dr. Wren. He won't pay any attention to me at all, and . . . I don't know what it is!"

"I'll go," replied Vainser. "You bring the doctor to him. It might be some form of gravity sickness; he was a ground-gripper before he came here."

"I don't think so," replied the man as he turned to carry out the order. "You look for yourself!"

Vainser lost no time in proceeding to Wren's room; and once there, he felt himself compelled to agree that something other than gravity sickness was wrong. The doctor, entering a minute or two later, agreed; but he could offer no suggestion as to what might actually be the trouble.

Wren was hanging in midair, relaxed, with the answer sheet that had cost so much work held before his face as though he were reading. There was nothing wrong with his attitude; anyone passing the open door and giving a casual glance within would have assumed him to be engaged in ordinary study.

But he made no answer when his name was called; not a motion of the eyeballs betrayed awareness of anything around him but that piece of paper. The doctor worked it gently from his grasp; the fingers resisted slightly, and remained in the position in which they were left. The eyes never moved; the paper might still have been there before them.

The doctor turned him so that he was facing one of the lights directly, waved his hands in front of Wren's face, snapped his fingers in front of the staring eyes, all without making the least impression on the psychologist's trancelike state. At last, after administering a number of stimulants intravenously without effect, the medical man admitted defeat.

"You'd better wrap him in a suit and get him to Earth, the quicker the better," he said. "There's nothing more I can do for him here. I can't even imagine what's wrong with him."

Vainser nodded slowly, and beckoned to the messenger and Rudd, who had come in during the examination. They took Wren's arms and

towed him out of the room toward the great air lock, Vainser and the doctor following. With some effort, his body was worked into a space-suit; and the old technician watched with a slowly gathering frown on his forehead as the helpless figure disappeared toward the outside. The frown was still there when Rudd came back to meet him in his office.

For several minutes the two looked at each other silently. Each knew what the other was thinking, but neither wanted to give voice to his opinion. At last, however, Rudd broke the silence.

"It was a better job than we realized." The other nodded.

"Trying to understand perfectly the workings of a brain — with a brain. We should have realized, especially after what happened a couple of weeks ago. Each thought image is a mechanical record in the brain tissue. How could a brain make a complete record of itself and its own operation? Even breaking the picture down into parts wouldn't save a man like Wren; for, with the picture as nearly complete as he could make it, he'd think, 'What change is this very thought making in the pattern?' and he'd try to include that in his mental picture; and then try to include the change due to *that*, and so on, thinking in smaller and smaller circles. He was conscious enough, I guess, so naturally the stimulants made no difference; and every usable cell of his brain was concentrated on that image, so none of the senses could possibly intrude. Well, he knows now how a brain works."

"Then all his work was wasted," remarked Rudd, "if everyone who understands it promptly loses the use of his mind. Maybe I'd better not build that machine after all. I wonder if there's any possible way of snapping the poor fellow out of it?"

"I should think so. Simply breaking the line of thought enough for him to forget a little of it should do the trick. It can't be done through his senses, as we learned, and stimulants are obviously the wrong thing from that point of view. I should simply deprive him of consciousness. Morphine should do it. I am enclosing a recommendation to that effect in his material, which will go back with him. I didn't want to suggest it to our own doctor; even if he didn't decide I was crazy, I wouldn't want to saddle him with that responsibility. I might, of course, be very wrong. The boys on Earth will have to make up their own minds."

"But I'm afraid you're right about the uselessness of his results. It was a doomed line of endeavor from the start, no matter what method of approach was used. As soon as you understand completely the working of the brain, your own is of no further use. Evidently all psychologists since the year dot have been chasing their tails, but were too far behind to realize it. Wren was brighter or luckier than the others—or perhaps, simply had better tools—and caught up with his!"

THE END.

IN TIMES TO COME

Quite some while back—in March 1943 to be exact—Lawrence O'Donnell had a yarn called "Clash By Night," concerning the Free Companies of Venus, and the undersea Keeps, where humanity had migrated with the destruction of Earth by atomic energy escaped from control.

Next month, O'Donnell is back with a long novel, "Fury!" laid against the same background—but slightly later in time. It's an interesting problem; a well-run society is a comfortable society. A society ruled by people with a truly adult, long-range viewpoint is apt to be well and smoothly organized. But by nature, such a society is not given to pioneering; who wants to leave the comfortable nest of a well-padded cultural set-up to establish a pioneering outpost? Why leave the comfortable, smoothly organized Keeps for the unutterably savage Venusian jungles on land?

It would take a strange and potent combination of personalities indeed to drive the men of the Keeps to climb out of the sea and onto the inhospitable land. But the strange combination appeared, and O'Donnell's yarn is great reading.

Also coming up next month is an interesting article by Willy Ley, not on the usual sort of scientific subjects, but on the strictly cockeyed pseudo-sciences. That the Nazis achieved some remarkable scientific triumphs is unquestionable; they did some truly important basic work on rocketry, and aeronautics. They tried on atomics, but got headed down the wrong road, and were stalemated. But to get the right focus on the Nazi accomplishments, Willy's review of their pseudo-science efforts is needed. They tried and accomplished some interesting things; the less widely realized fact is that they tried an enormous number of things, most of them as fanatic as a Nazi himself, and their successes were strictly of the shotgun type. If you ride off madly in all directions you're practically certain to arrive somewhere. Ley's article can't possibly review all the truly amazing collection of would-be sciences they tried—but it will give you an idea.

Nazi successes become understandable; any gang that would try some of the things they went in for was bound to hit on a few things that worked!

THE EDITOR.

THE ANALYTICAL LABORATORY

Once in a while, the An Lab gets squeezed in between the two sides of a sheet where it can't be seen, so we have to run it the next month. This is the first time, however, that we've had two successive An Lab squeeze-outs. Below, therefore, we are publishing actually the An Labs for the issues which appeared on the stands during the last quarter of 1946. It is not our intention to reduce the Lab to a quarterly feature; it's simply that the elasticity of type metal is of a metallic, not an elastomeric order of magnitude. When we've got more than enough to fill the pages of the magazine, something has to give; this issue we *had* to get the Lab in, so Brass Tacks got squeezed out instead.

This is also a general "Thank'ee" note; for some reason, last November an unusual number of readers felt in an expansive—or expressive—mood, and we had an unusually large collection of votes. We like it that way; we had about two and a half times the usual number of letters and post cards. The result is that the report on the December issue—which was out in November—represents a quite fair sampling of opinion.

The reports run as follows:

NOVEMBER, 1946

Place	Story	Author	Points
1.	Hobbies	Clifford D. Simak	1.59
2.	Mewhu's Jet	Theodore Sturgeon	2.53
3.	The Chronicler (Pt. II)	A. E. van Vogt	3.25
4.	Tower of Darkness	A. Bertram Chandler	3.68
5.	Unforeseen	Mark Champion	3.84

DECEMBER, 1946

Place	Story	Author	Points
1.	Metamorphosite	Eric Frank Russell	1.32
2.	Hand of the Gods	A. E. van Vogt	2.75
3.	For The Public	Bernard I. Kahn	2.94
4.	Time Enough	Lewis Padgett	3.76
5.	Impossible Pirate	George A. Smith	4.19

JANUARY, 1947

Place	Story	Author	Points
1.	Tomorrow And Tomorrow	Lewis Padgett	2.19
2.	Command	Bernard I. Kahn	3.03
3.	The Undamned	George O. Smith	3.17
4.	Sinecure 6	Horace B. Fyfe	4.00
5.	Housing Shortage	Harry Walton	4.20

THE EDITOR.

It's a curious, but perfectly human, phenomenon that most of the time, the hard-fisted, practical, efficient leader, not the idealist, is the defender of knowledge. There's a reason. For instance—

AN ENEMY OF KNOWLEDGE

BY A. M. PHILLIPS

Illustrated by Bernbach

"My name is Ozymandias, king of kings:
Look on my works, ye Mighty, and despair!"

From "Ozymandias"
by Percy Bysshe Shelley.

I.

"Who told you to bring in prisoners? We ain't got enough to feed ourself! Take um over there in the bushes an' shoot um!" There was still some desultory firing in the maze of tall cactus to the south. The speaker didn't even glance at the man he had condemned to death, but kept his eyes upon the edge of the cactus, counting his men as they came out. He was gratified that he had lost so few.

"But, capt'n, this feller's got bums—these guys come f'um a *city!* Lookit the clothes and the guns!"

If the man addressed was a captain, he didn't look it. The only garment in the least military was his jacket—a high-collared gray coat set with tarnished metal buttons and almost vanished insignia. That he wore it at all in the smothering heat was an indication that he regarded it as a mark of

rank. It hung unbuttoned, and his sunburnt chest, shirtless, was visible between its edges. The rest of his clothing was utterly nondescript—faded, shapeless pants thrust into ruined boots, and on his head a high-crowned, broad-brimmed hat that shielded his eyes from the direct rays of the blinding sun.

He glanced at the prisoner now, his colorless eyes devoid of humanity. "Lessee the bum."

It was handed to him, and he turned it over in his hand, examining it. It was of a type new to him—very small and compact, and without any apparent firing device.

"Hey, Dogeye!" shouted one of the men excitedly, coming up to him. "Lookit the clothes 'ese guy's got! Cloth, they are! An' whut else you think they got—"

The captain turned upon him with a cold, snakelike venom. "Jud!" He half raised the heavy calibre pistol he held in his right hand, and the big man shrank back. "I'm *Captain* Dogeye! I ain't gonna tell yu again! The next time I shoot!"

"I fergit, captain." Jud backed away uneasily. "I'm sorry, Captain Dogeye. Won't fergit agin."

"Lessee the clothes."

Jud handed him several garments and made his escape. All of the men and women emerging from the stand of cactus were similarly burdened. Some carried several rifles under an arm, or rounds of ammunition, or had cartridge belts hung over their shoulders.

They carried their loot to the long line of cars standing in the rutted, sandy trail that led back eastward across the desert. That caravan of cars, and the winding trail that stretched mile on mile to east and west, vanishing in distance and the drab desert vegetation, were the only indications of man in all that blazing wilderness.

A more motley congress of vehicles would have been difficult to assemble. They were metal, streamlined automobiles of a multitude of types and designs; metal carts and barrows of all shapes and sizes; crude wooden wagons with tree-trunk sections for wheels; and even crossed poles dragging behind one or two horses in the manner of the ancient Indian travois. Without variation, all of the metal conveyances were in the last stages of decay. They were battered and paintless; rusted, ripped open, and sometimes burnt. In some, gaping holes had been crudely patched with raw lumber, or odd bits of sheet metal. Metal and wooden vehicles alike were spotted and scarred with bullet holes.

They had one other thing in common. Not one of these wrecks moved under its own power. A few horses, and fewer oxen, were hitched to some of the heavier transports. The rest were drawn by human beings, most of whom were women. Rough yokes, or traces, had been affixed to the automobiles, and women stood in the places—two to four to a car, depending upon its size and the load it carried. They were rest-

ing now that the caravan was halted: leaning on the yokes, or mingling excitedly and acquisitively with their returning companions, and exclaiming over the booty they brought.

This booty consisted exclusively of firearms, ammunition, and clothing—the last frequently and significantly stained dark red. There was a very evident want of clothing among these people, for of all the persons there assembled only Captain Dogeye was outfitted in cloth; the rest wore garments made of the skins of animals—tanned deerhide, in most cases. The majority of these travelers—men and women alike—went half naked, and the exposed, upper parts of their bodies were burnt by the sun to a dark, coppery brown. Some wore hats—faded and tattered felts, or coolielike hats made of dried, yellow reed. Of skirts there were none. Both sexes wore tanned deerhide trousers, often fancifully fringed and ornamented. Except for the light eyes, the occasional blonde and chestnut hair, and the lack of body painting and head feathers they might very well have been a band of Amerindians.

Captain Dogeye kept watch until all of his tribesmen returned. Then he turned to the prisoner. "Yu got more of these bums?"

The man nodded, his face gray with the fear of death. He handed over four or five of the small grenades.

Dogeye returned one to him. "Show me how to make it blow up. Throw it over there."

The man explained the operation of the bomb, then touched it off and threw it with all his strength. There was a moment's silence, then a shattering explosion and a blue flash visible even in the bright sunlight. The entire tribe, with the exception of Dogeye, the prisoner, and a few men and women watching nearby, flung themselves to the ground or dived under the cars. A column of dust, smoke, and debris towered momentarily over the cactus, then began drifting away. Rifle barrels poked out from under the cars, facing the cactus.

"Where you git 'um?" asked Dogeye.

"A *city!*" said the prisoner, waving a hand vaguely westward.

"Yo're lyin'!"

"No! No! A city! Over there!"

"How far?"

The man shrugged. "Three days. Four days. Maybe more for you." He gestured toward the caravan.

Dogeye handed the grenades to the man who had brought the prisoner in. "Take 'um down to the arsenal wagon, Jim. You come," he said to the prisoner.

He walked over to the heap of clothing and equipment that had by now been piled in one of the empty carts. The tribe was emerging from under the wagons, brown faces sheepish. The men and women gathered about their captain; the prisoner shifted nervously beside him. One old woman

—tiny, wrinkled, and bent—watched with a pair of wise, bright, birdlike black eyes. She had been standing by the cart when the bomb exploded, and had watched her fellows take cover with elfish amusement, herself unmoving. She, too, wore the deerskin trousers, but the upper part of her body was protected from the hot sun by a light linen jacket, which she had already appropriated from the pile of clothes in the cart. Now she watched Dogeye, and he avoided her glance.

Near her stood a slim boy of about seventeen, dark and slight, and no taller than the stumpy "captain." He moved away under the lash of the captain's wolfish eyes.

"Come 'ere, Tommy," said the old woman. The boy moved closer to her, the captain muttered, the old woman stared. With a shrug of contempt Dogeye went to the cart, and began pulling at the heap of clothing. Most of it was of a military cut and pattern, and all of it was in far better condition, except for the fresh stains and bullet holes, than anything the captain wore.

Dogeye selected an outfit for himself, and directed one of the women to take it to his private wagon. Then he fumbled among the litter of equipment on the bottom of the cart. He held up a mask. It had round glass eyes and a long, pleated snout.

"What's this thing?" demanded Dogeye.

His tribesfolk stared at it, unanswering. "That's a gas mask," said the old woman, when no one else spoke. "Ev'body had one them things when I was a girl. Needed 'um, too!"

"Whut's it for?" asked one of the men.

"Yu dummy!" exclaimed the old woman. "It's fer gas! Without one o' them things on the gas'd kill yu!"

Dogeye threw the mask into the brush at the side of the trail. "Ain't no use to us. Listen, folks, this here feller says he knows where there's a city!" There was a chorus of exclamations. Dogeye turned to the prisoner. "You take us there, an' you c'n be one of us. If yu don't, we'll shoot yu."

"I'll take you," said the prisoner, rapidly. "I know the way! I'll take yu right to it!"

"I'm Captain Dogeye, an' don't fergit the captain. What's yore name?"

"Bunch."

"How many men in this here city, Bunch?"

"Lot. They druve us out."

"How many?"

"Hundred, mebbe. They got a gun on wheels!"

"Your captain musta been a fool, Bunch; tryin' tu bushwhack us when he on'y had thirty-forty men! Whut made 'im try it?"

"He thought the bum's do it, Cap'n Dogeye."

"A fool. Whut good's bums when we scatter? All he did was bust a couple wagons and kill some folks, an' get hisself shot. 'Fy know there was a city so close, I'd taken yu prisoner—set my fellers free f'um pullin' 'ese wagons, so 'ey

could fight. Yu get these clothes in the city, too?"

"Clothes, guns, an' FOOD! Plenty food in cans!"

"Any books there?"

"Books?"

"Yeah! Books! Writin'!"

Bunch frowned with thought. "Yeah," he said, slowly, "there wuz books there, I guess. Lot o' stuff I don't know what. Great big bums—big's a man. Machines, too. Wagons like you got"—he pointed at an automobile—"on'y new."

Dogeye grunted with satisfaction. "We get goin'. Any water on the way?"

Bunch nodded, pointed toward a far, flat mesa that rose against the brassy western sky.

"O.K." Dogeye gestured toward the cart. "You fellers take whut yu want, and we get started."

Men and women crowded around the cart, making selections from the booty it contained. Although the clothing vanished, few donned new garments. Their greatest interest was in the firearms. Old pieces, worn-out, were discarded; and arms for which ammunition had been exhausted, and no fresh supply found.

Dogeye alone went to his personal cart and reclothed himself from the selection he had made. Of his former clothing, he retained only the pearl-gray cowboy hat. When he had finished dressing, he mounted a well-kept black mare, which had been held by one of the women, and rode back along the line of cars, giving orders.

Preparations were simple. The few dead were buried in the trail, and their graves camouflaged. They were buried deep, to the disappointment of the circling vultures. The old woman, who was addressed by the tribe as "Gram," or "Gram-mom," recited a brief service over the graves. A few wounded were in the carts, along with one or two pregnant women who were near their time.

The armed men and women fell into broken, widely spaced Indian-files on either side of the caravan; other women, some older children, and one or two men took their places in the yokes and traces. They removed upper garments, donned when the carvan had halted.

A signal shot was answered by scouts sent out ahead and behind; horses—very few—were clucked to; brown-skinned women leaned on the traces; and with loud squealing from rusted axles, and creaking from wooden ones, the caravan moved forward.

II.

The boy Tommy was one of those who pulled. His was a light, metal cart, four-wheeled. It had high sides, very much broken; and its contents were covered with hide. His companion was a tall, powerful girl, dark-eyed, and with an amazing wealth of corn-yellow hair, bound back with a band around her forehead. With that thick mane,

she needed no further protection from the sun.

The two of them leaned into the leather traces, which fitted over their shoulders. The girl dug her moccasined feet into the sand and heaved, the quick sweat gleaming on her brown shoulders.

"Come on, Tommy! Pull!" she whispered. "You want ol' Dogeye back here a-yammerin'?"

Tommy grunted and shoved, and the cart, which had settled in the sand, heaved free and rolled on. They ran a little to catch up with the car ahead, then settled into a familiar, forward-leaning, slow-paced walk.

"Yu c'n let up now, Tommy. I c'n pull 'er."

"'M all right, Nellmay," the boy replied, gasping a little. "Been feelin' better ev' since we got outa that cold country. Like this here hot sun. Think I'm gonna get well out here."

"You jes' walk then, an' git well."

"Whyn't you take a gun, Nellmay? You got no call to be pullin' at this wagon! You one of the bes' fighters we got!"

"Whyn't yuself take a gun!" snapped Nellmay, refusing to look at him. "You ain't a prisoner. If Dogeye knew you was the best pistol shot we got, he'd make yu take a gun! Shoot yu if yu didn't! Way he's actin' t'ords yu, he's like to kill yu anyhow, not knowin'!"

"I'm agin killin'!" said the boy, with a pathetic seriousness. "Allus akillin', an' what for? Lissen whut Gram-mom tells us, 'bout when she was a little girl. They knew things then; folks could all read, make their own clothes outa cloth, keep foodstuffs so's it won't spoil. They had doctors, an' houses, an' light out of a wire. They had machines in these here wagons to make um go by theirselves. They had great big houses, high as mountains, all made outa stone! They had machines could fly up in the air, 'thout nothin' holdin' um up. They had . . . oh, all sorts o' things . . . books an' medicine an' clothes an' machines! An' whut'd they do? Whut'd they do? Busted theyselves all to pieces, thass what! Killin'! Killin' ev' way they knew how—killin' ev-body! Had machines akillin', they did! Kill thousand fellers all to onct! Fly over um and drop bums big's one o' these wagons—bigger! They had cities all over, an' when's the last time we see a city? Why, it was 'way 'tother side the big river! Ain't seen a real city since—just messes, an' piles of rock, an' iron. And gas, Nellmay; they had gas—stuff like smoke, only it killed yu when you smelled it. Gram'll tell yu. They had guns's big as tree trunks—bigger. An' they kep' on a-killin' till they was all gone—till they was just folks like us left, out in the hills. Folks in the woods and mountains that ain't killed, an' don't die in the dyin' time afterwards. An' what was it for; what was they a-killin' for? I don't know, cain't find out. Gram don't know. Nobody knows. Guess it was just like Dogeye—killin' to be boss; killin' to be captain, an' have the best pick

of ev'thing. Seems to me folks that knowed 'smuch as they did woulda had better sense. *I'm* not killin', anyways, lessen it's somebody tryin' to kill me. But you ain't thinkin' that way, Nellmay. You could take a gun an' maybe have a gang of your own sometime."

"I don' want no gun!"

"Aw, yo're jest stayin' here to help me! You oughta take a gun—"

"An' get myself all shot for ol' Dogeye? We ev' get a gang for ourselves I'll take a gun, mighty quick!"

"Maybe then there is no more guns. Whose makin' um? Nobody. Leastways, nobody we see, an' we come a mighty long ways, Nellmay. Gram-mom showed me 'bout bows an' arrers. Made some. Been tryin' it out in the bush where Dogeye don't see me. Killed that rabbit yestidday with um."

"Yu gotta show me 'bout that!" Nellmay's warm brown eyes turned on him, her tanned face intent. "Next time we camp, we sneak out some 'eres, an' you show me. An' don't tell nobody else!"

"Gram-mom's teachin' me t'read, too! We ever get to a real city where there's books, I'll learn a lot!"

Nellmay looked at him admiringly, then, seeing Captain Dogeye riding toward them along the column, her expression became wooden. She leaned into the harness, head bent, the powerful muscles of her back moving lithely under the sleek skin. Dogeye rode past, with a look of contempt and irritation for Tommy.

The afternoon waned, while the caravan moved slowly westward. The dance of the heat-devils died down, and distances clarified, came closer. Mile on mile, in every direction, extended the desert, glowing in the golden evening light. Along the horizons high, level mesas, and the jagged rocks of deep strata that here rose to the surface, caught the fiery sunset light and burned red, and gold, and deep, hot brown.

Life moved, there on the desert. Except for man, it was abundant. Jack-rabbits bounced away like fleas from the head of the caravan. Birds shot out of the bush, and dove into it again, like flying fish on the ocean. Vultures, patient and assured, moved in great, measured circles in the pure, clear vault of blue above. And now and again, in the distance, the travelers caught sight of small herds of larger animals—horses, and cattle; gone wild, reverting to ancient stirps that needed no aid from man to exist. there were antelope, too, and some of them were shot for meat by the flanking scouts.

There were other animals—great shaggy beasts with huge shoulder humps, and short, curved horns. The caravan was halted when these beasts were sighted, and the few horses unhitched. The best riders mounted, and set out in the last of the sunlight for the distant, wary herd. They were valued above the other animals, these

beasts; for not only was their meat good—their hides were thick and warm. The tribesfolk didn't know that long before them other men had hunted the buffalo, hunted it almost to extinction. The tribesfolk didn't even know the name buffalo. And now that the enemy was vanished, the ancient lords of the prairie were drifting back, trampling across disappearing wheat fields, making their wallows in the slowly filling shell holes and mine craters.

Fires were lit, the evening meals cooked. Water was doled out sparingly. The hunters returned with darkness, bringing meat. Others had remained with the carcasses; camped there for the night, to guard them against the desert animals. In the morning, they would be skinned, and the bulk of the meat divided.

With the night came cold, and the tribe put on its heavier clothing, and gathered about the fires. Coyotes yapped, and far off wolves howled. Men shivered at the sound, feeling its immemorial mystery. The blanketed sentries gripped their guns more tightly.

A clear contralto voice rose, and was lost in the wide night. *". . . No place on earth do I love more sincerely. . . ."*

"Where at's Virginny, Mom?" asked one of the few, quiet children.

"Dunno, Janey. It's jus' a song. An old song."

A child was born that night, and an old man died, taking with him into the silence of death all his memories, and the bits of knowledge he had gathered, or been taught. One by one the fires were banked, or allowed to go out. The tribe slept, all but the sentries. They did not know they had passed a crest—that their fathers had passed the crest, and they were moving down a long slope, the other side of which it had taken their ancestors a million years to ascend. They would go down more quickly.

III.

It was on the second day that they came to the railroad tracks. They knew they were approaching something because of the increasing roughness of the country. The trail led around deep hollows that had once been raw, gaping gouges in the earth. Erosion and the unconquerable green ranks of growing things were healing the scars.

Dogeye was wary, fearing he was being led into another ambush, although Bunch assured him that they were not yet near the city—that it was just "ol' things—places where there was metal."

There was little left when they reached the one-time railroad line. Ties had long since rotted away, or been used by wandering bands for firewood. And only an occasional metal rail, rusted and in places completely buried, remained. Iron and steel had once been of tremendous value—for guns, and bullets, and armorplate.

The tribe stared at this mute record written in the enduring desert. What was it? Why had

the old ones laid these metal rails and then destroyed them? What had they been for?

"Had machines," explained Grandmom. "Long line of um, like these here wagons. All hitched t'gether, an' the first one pulled um all. The wheels rolled on these yere bars."

"Whut fer?" asked Dogeye.

"'Whut fer'? What'd yu mean, whut fer? To git places, whut else?"

"I mean, whut fer they rolled on bars? Whyn't they jus' roll, like we do?"

Gram-mom frowned. "Dunno," she admitted. "But that's the way they did it. Saw um onct, when I wuz three-four years old. All smooth, and goin' like a deer! Aw! Faster! Goin' like a bullet!"

The tribe stared in silent, awed wonder. They had been strange people, the old ones, with strange ways. But they had left what seemed an inexhaustible supply of guns and bullets; every city of which there was enough left to explore had given them guns and bullets abundantly, in far greater measure than of the preserved foods that they occasionally found. The old ones must have been admirable killers!

"Come on," ordered Dogeye. "Get goin'! We get to that city, I show yu somethin!' If they got books like Bunch says, we gonna stay there! Fer awhile, anyways. Gram-mom, yo're gonna teach some of the fellers readin'. I got plans!"

Around the railroad line the earth had been torn up terrifically. The caravan wound in and out between the worst of the craters, but there was no level ground here. Even those strong women who had dragged the disintegrating cars through so much rough country—through rising forests, over mountains—even they found this chaotic terrain difficult. Thighs bent with arching muscles; backs bowed, the muscles and tendons standing out under the brown, polished skin. The armed lines of guards joined in, pushing from behind, hauling on the traces, bracing the sides—the men and women slung their guns over their shoulders, or threw them in the carts and wagons, and added their strength to that of the straining women in the traces, and gradually the caravan crawled on.

Tommy's cart was stuck. The wheels on the left had slid over into a crater; had sunk axle-deep in loose sand. Dogeye rode up while he and Nellmay, and three or four men and women guards, were fighting to get it free. Gram-mom was standing nearby, watching, calling occasional warning, or experience-wise advice.

Tommy's struggles were almost of no assistance at all, his slight weight and thin limbs in sharp contrast to the robust health and strength of his companions.

Dogeye watched him, his flat eyes vicious. Without warning, he drew the heavy pistol from its holster at his hip. The round black muzzle was settling on Tommy when Gram-mom knocked up Dogeye's arm.

"Whut yu doin', yu killer!" she demanded, her voice thin and harsh. "Ain't yu got enough killin' with the folks we meet, 'thout us? Want tu kill ev'body, do yu?"

"Jus' him," interrupted Dogeye, his eyes still on Tommy. "He ain't no use. Won't fight—cain't pull. He's jus' another mouth, 'at's all 'e is! Look at um, standin' there doin' nothin'! Leggo me, yu ol' buzzard—"

Nellmay was out of the harness. She had shaken it off, stepped away from the cart, leaving the other to hold it. She faced him fearlessly, shoulders thrown back, brown eyes hot under level brows.

"I c'n pull fer um!" she declared. "I ain't complainin', am I? He's in harness with me, an' if I don't care, whut you go to do with it?"

"Shut up, Nellmay! An' gitchur han' away f'um that knife! I ain't carin' if I have to kill you, too! Do it quick. Yu forgit I'm captain!"

"You ain't killin' nobody, Dogeye!" Gram-mom, tiny, and shaking with fury, stood before him like a militant rabbit facing a wolf. "I say yu ain't killin' nobody, lessen yu wanta kill me! An' I know yu ain't aimin' t' do that! Don't fergit I'm t' only one 'at reads! Don't fergit it, yu dirty murderer, 'cause I ain't!"

"Talk t' me like that, will yu!" Dogeye's gun came up again. His face was red and contorted, his cold eyes furious. It was the deadly fury of offended egomania, and as dangerous as an angered snake. Nellmay gathered herself to spring, the bright blade of the knife slipping from the sheath in her belt. The others watched, waited, faces wooden. They stood where they were, braced against the cart, holding it from slipping further.

For a moment the tension held.

then, with an effort that set the blood vessels of face and neck pumping rapidly, Dogeye conquered his fury. He slipped the gun back in its holster, cursed them all with shocking vileness, and rode off toward the head of the line.

Gram-mom started after him, her small, wrinkled face dark with anger. "Um gonna get me a gun!" she announced. "Thet skunk come botherin' us again, Ah blow his stinkin' head off!"

"Ain't no use, Gram-mom," said Tommy, wearily. "He's captain. You shoot him, the folks'll kill yu. 'Sides, he's got fellers with um all the time—Jud was over there, 'hint the wagon, watching—they shoot yu before yu could git um. I'll git a gun, 'n' some water an' stuff, an' sneak out t'night—"

"I'm goin' with yu," said Nellmay. She was back in harness. She looked around at the men and women pushing at the cart. "Any you fellers do any talkin' 'bout this, I'll rip yu open!" She showed them the knife. None answered. They bent their backs, and slowly the cart was forced out of the trap. Tommy got back in harness. The caravan went on.

"Yu ain't gonna sneak out, Tommy," stated Gram-mom, walking beside him. "Yu wouldn't git nowheres. Yu take a gun an' stuff. Dogeye'd send t' scouts after yu. 'N' if 'e didn't, s'mother gang'd gitchuh. I'll tell yu whut t'do. Got it all figgered out. This here city, now. Dogeye won't stay long—week maybe. Maybe two. When he goes, you an' me an' Nellmay, an' maybe couple others, we stay. Easy t'hide in a city. Plenty places. An' th's water, an' food — some, anyways. An' if folks come, we c'n keep clear of um, or fight um off. An' maybe we c'n get stuff growing—"

"But, Gram-mom!" interrupted Nellmay. "He'll kill Tommy befoh we git to the city! He's gittin' madder all the time!"

"Won't kill um whiles I'm here," said Gram-mom. "He's gotta do like I tell um—'bout that he will, anyways. He wants some the fellers t'do readin', an' I'm the on'y one c'n teach um. He won't kill me!"

"Whut's he want readin' fer?" asked Tommy, curiously.

"Why, Tommy, yu ninnyhammer, he wants tu read the books in this here city! Thinks the books'll tell um how t' *make* guns an' bullets. Make clothes, bums. Even heard um talkin' t' Jud 'bout gas. Thinks maybe these books tell um how t' fix up these wagons; teach um how to make um go by theirselves, 'thout anybody pullin'. Got big idears, Dogeye has. Iff'n he could learn all that, he'd be top dog 'round here. Boss over ev'body all over—captain fur as the land goes."

"Wants readin' jus' to do more killin', bigger killin'," said Tommy, frowning in thought. "Start it all over agin. Be like the old ones—like you told us, Gram—akillin' an' akillin' till they ain't hardly nobody lef'. Jus' so's Dogeye c'n ride 'round on his horse, an' say he's captain.

"Kin he fin' out all that f'um the books, Gram?"

"Guess he kin," said Gram-mom. "Some, anyways. They writ it all out in the books, the old ones. That's how they learnt—readin'. Be pretty hard. Hafta take the books that tell 'bout them things with um—fill a wagon with um, an' carry um ev'wheres we go. Or maybe Dogeye's fixin' to stay on in the city! Said he had a plan. Maybe that's whut 'tis! Stay on in the city, livin' off the game 'round here, an' whut p'served food he c'n fin'. Maybe he's even figgerin' on growin' things. Books'd tell bout that, too. An' we got big 'nuff gang here to keep most other gangs off. He could do it. Take long time, 'nawful long time, but Dogeye's a bugger when 'is mind's set."

"Yu oughtn't t' learn um readin', Gram-mom! Yu oughtn't to do it!"

"They got ways o' makin' yu, Tommy. Yu ain't fergot Emmie, has yu?"

Tommy shuddered. Emmie had been captured away from her tribe, and had refused—at first—to lead Dogeye's warriors in a surprise attack upon her own people.

"Gotta stop 'im! Gotta! The's been 'nuff killin'!"

"*Cain't* stop um," said Gram-mom, philosophically. "Less yu kill *me*. An' even then, betcha Dogeye'd scout around till he found somebody else 'ut could read. Anyways, Tommy, don't sneak off till we get to the city, an' see whut Dogeye's gonna do."

"Um gonna fin' a way to stop um!" said Tommy.

The next day Bunch led them to another spring, and they were lavish with water, drinking to repletion, bathing in it. And their water containers were full when they went on.

The country was rising, and becoming more arid. The abrupt, high mesas and outcroppings of rock were more frequent, and the distant western horizon showed a jagged line that Bunch said was mountains. It was unsteady with distance, and almost the color of the dark blue sky; and it vanished and reappeared with changes in the atmosphere.

The trail vanished entirely. There were no signs of man at all in this silent, empty wilderness. Even the bomb craters disappeared.

Lizards took the place of the jack rabbits. Once they saw a strange group of animals—long-necked and long-legged out of all proportion to their bodies—that galloped swiftly, awkwardly, and silently away. The caravan halted in astonishment to stare after the incredible creatures. None of them—with the possible exception of Gram-mom—had ever seen a giraffe. At least, they surprised her less than the others.

"The old uns used tu keep critters in cities—queer critters yu'd never see runnin' loose. Guess them things—or they mammies an' pappies—got free an' took to livin' off the land."

"Whut fer they keep um in cities?" asked Nellmay.

"Kept um there to look at," explained Gram-mom. "Had great big places fer um. Fed um ev' day, too."

The tribe shook its head in bewilderment at the ways of the old ones.

Their course leaned southwest now. They were traveling into regions ever more desert. Bunch had scouts out far ahead and on both flanks—they were approaching the city. The toiling caravan could occasionally see the flanking scouts above the inequalities of the ground. They looked tiny, insignificant, moving across some slight elevation with that vast expanse of empty desert for a backdrop. Yet there was in their postures, in their movements, a wolfishness, a competent, predatory assurance. The tribe knew security — Dogeye's scouts were good.

It was late afternoon when the caravan halted. This, said Bunch, was as far as the caravan could travel; from here on it must be the war party alone. They would strike at dawn.

IV.

Bunch had selected excellent cover for the caravan. He had led them to a pass, a cleft, between two isolated, rounded shoulders of rock that rose out of the desert. The long narrow pass was like the mark of a Jovian ax, splitting the great hemisphere of rock clean across its middle, and was far longer than the total length of the caravan. Stretched out in the pass like a gigantic centipede, the caravan was invisible from the desert. Only an observer gazing along the line of the cleft would know of its presence here.

Eastward, the desert extended to a far, level horizon. Seen from one of the two great gateways to the cleft, it looked deceptively flat and featureless. Only the buzzards moved above it, swinging in wide, patient orbits. Westward, the terrain was utterly different. Steep cliffs rose to a high tableland, cliffs broken and eroded by long, slow ages of heat and cold, wind and rain. Huge talus slopes along the base of the cliffs were mute indications of the deep, wide river of time that had flowed across this landscape. Deep and frequent canyons cut back into the mesa, testifying that water had once flowed abundantly here. Now only light streamed down most of them—the hot red light of sunset. It blazed on canyon walls, making their shadowed depths even darker. High columns of rock, separated from the main mass, stood half-buried in the talus slopes, and the sunlight touched their summits, lighting them like beacons. As the sun went down the light ebbed, and the shadow cast by the towering wall of the cliffs crept out upon the desert. With it came the chill of evening.

The city, Bunch told them, lay "up there." Sentries were posted in the canyons he indicated, that led to it; and guards stood at each end

of the cleft occupied by the caravan.

Few of the tribe slept that night. Weapons were polished and cleaned, and ammunition belts loaded. Only one fire was lit. It was hidden in a recess in the rock, deep within the cleft, and blanketed carts were drawn up around it so that no least flash or sparkle of light should leak out revealingly. It was not used for cooking, but for light. The silent, Indianlike men and women worked beside it, oiling guns, testing trigger and bolt action, sharpening sheath knives already scraped half away. Small, light carts, that could be hauled up the rocky floors of the gorges, were loaded with reserve stores of ammunition, water, grenades, and such crude and primitive first-aid equipment as the tribe possessed.

Tommy and Nellmay sat by their cart, their backs against the smooth rock of the passage wall. They were well wrapped up now, against the cold breath of the desert that drifted erratically through the cleft. Nellmay's firm, rounded chin was sunk in the high, stiff collar of a heavy military coat. Her thick blond hair glimmered palely against the dark gray stone, framing her piquant, serious face. She was chewing contentedly a strip of dried, smoked meat, her jaw moving up and down between the unbuttoned edges of the collar. Less sensitive to the cold, the thick, woolen coat sufficed for her; her legs and feet were still protected only by the leather trousers and moccasins. Tommy had drawn dark pantaloons over his leather stockings, and he was almost lost in a dark blue greatcoat several sizes too large for him. A shapeless gray felt hat pulled down until it met the flaring collar of the overcoat marked the position of his head.

Nellmay ate in companionable silence, her knees drawn up before her. She watched lazily the shadowy figures of her tribesfolk, moving in purposeful silence among the black bulks of the caravan.

"Lookit," said Tommy. He drew from one pocket of the greatcoat a heavy black automatic. The big, sullen-looking gun made his thin, bony hand seem even smaller. But that small, brown, skinny hand held the heavy gun with familiarity and assurance.

Nellmay stared at it, her brown eyes wide. "Whatcha figgerin', Tommy?" she whispered. "Yu fixin' to get Dogeye?"

"Unh-unh." Tommy shook his head doggedly. "Not lessen he makes me! I ain't killin' less I hafta. But I'm gonna stop um f'm readin' how t' kill better. I gotta plan. I'll haft sneak away f'um the gang afterwards, an' live by my lone, so I'll need gun an' stuff—"

"Whut plan yu got?"

"'Ltell yu. But yu gotta stay 'way, Nellmay! Yu got no call gettin' inta trouble 'bout this here. Yu gotta stay 'way!"

"Goin' with yu!" said Nellmay, her brows drawn together. She bit viciously into the chunk of meat.

"Hey, Nellmay! Yo're pullin' tomorra!" It was the man named Jud. He loomed out of the

shadowy bustle of preparation, speaking in a rapid undertone, and would have passed on, but Tommy said to him: "Then I'm pullin' with'ur."

"Dogeye ain't say nuthin' 'bout you! You cain't pull, yu little rabbit, an' if yu get stuck tomorra, yu c'n kiss y'se'f good-by. Nellmay's pullin' a bum-wagon."

"You tell Dogeye I'm pullin'!"

"'Fee lets yu, an' yu ain't there when wanted, I'll shoot yu m'se'f!" said Jud, walking away.

"Whut fur yu wanta pull tomorra?" asked Nellmay, uneasily. "That feller Jud like to kill yu—"

"Gotta git in the city, Nellmay. Git there right 'way, 'fore he gits any of the books. Here's the way I'm figgerin'—"

The brilliant desert stars revolved, moving westward with the night, while the two sat, heads together, and Nellmay gasped at the plan Tommy unfolded. She argued and protested, but the boy was firm. They were still wrangling when they were summoned to their places in harness.

"Yu'll git kilt fer sure, Tommy!" whispered Nellmay fiercely. "Yu ain't got a chanct! Don'cha do it, Tommy! Whatcha care 'bout whut ol' Dogeye does? Let um read the books!"

"Um gonna stop 'im!" said Tommy doggedly. "I git kilt it don't matter none, long's he ain't findin' out how tu kill lotsa folks all to onct! Better me git kilt thun fer folks all over have him ashootin' an' akillin' an' abummin'!"

Jud walked past, and heard the whispering. "Shut up!" he snarled at them. "An' keep shut up! An' that goes fer all you fellers," he said more loudly to the rest of the war party. "We git out there, any feller make a noise I rip um open!"

The line formed, and trailed out of the cleft. The least squeaky of the carts had been selected, and their axles anointed with carefully measured amounts of precious oil.

The desert glimmered, palely, under the bright stars; the cliffs were black and frowning. Ahead, a mournful bird cry was a signal from the sentries posted at the canyon mouths.

Bunch and Dogeye led them, Dogeye walking now. His horse was too valuable to risk in mountain warfare, where its superior speed over men on foot would be negated.

One of the reasons for Captain Dogeye's success in his time and place was his caution. He gambled rarely, and placed more value on his men and women than had those other wandering commanders whom he had met and vanquished. The war party he assembled numbered less than half of his available fighting folk; an almost equally large defense corps was left as a guard over the caravan, and at each of the canyon mouths that Bunch told him led to the city another, smaller force was stationed, only to advance toward the city on receipt of signals.

The main party, which he himself

headed—for Captain Dogeye, like other, greater, of his prototypes, was no coward—filed into the black mouth of a canyon. They went forward without nervousness, calmly, and with assurance. There were no recruits here; all were veterans of many such engagements. The ammunition wagons, heavily guarded, came last. Tommy, pulling in careful silence at Nellmay's side, heard the faint scrape and clatter of wheel on rock.

The surface began sloping upward. There was the low sound of panting breath from those who pulled, and the soft shuffle of many moccasined feet.

High above, between the crowding walls of rock, the stars burned, watching the action of a play of which they had long ago grown weary. Actors, settings, and equipment changed, but the plot remained the same.

The canyon angled, and the grade steepened. Low whistles and faint calls became more frequent: Dogeye was calling back scout after scout to report. He was uneasy at encountering no single sentry. *He* would have had pickets—a number of them—in each of these gorges. Bunch, too, was mystified and disturbed.

"Ain't many folks 'round here, though," he muttered to Dogeye. "Maybe they ain't figgerin' on anybody comin' on um. Ain't 'neasy place t'find, this here city."

"Knew your gang was 'round, din't they?" said Dogeye, shortly. "Yo're gang knowed where the city is. Maybe you're fixing to cross me, huh?"

The man protested, terrified. The atmosphere was cleared by the arrival of a woman scout. She glided silently to the head of the column, her advent announced by guarded calls.

"Found one," she whispered. "Up top. 'E's drunk."

So that was it! Dogeye grunted with contempt. They must have defeated Bunch's tribe so decisively that they knew they would not be attacked by them, and they expected attack from no one else—this city was well hidden, and, according to Bunch, there were few gangs wandering this desolation. The present holders of the city felt they could afford to relax. Dogeye smiled sourly. He would correct them in this opinion.

The next sentry located was awake and sober, but utterly unexpectant of attack. He gave his tribe no warning of the impending assault.

Dogeye's scouts fanned out. The few sentries were stationed along the rim of the gorge—on ledges, or on the grassy tableland of the summit. Near each of them firewood was laid—dry wood, grass, and leaves that would flare up at the touch of a spark. But the scouts saw to it that no fires were lighted. Nor was any warning gun discharged.

Behind them the sky was beginning to lighten—the ashy gray of dawn was welling up from below the eastern horizon. The morn-

ing star, but newly risen, died in the growing light.

V.

The sun and the war party reached the top of the mesa together. The canyon ended in a dry, shallow stream bed, floored with deposits of rich soil; and as their heads rose above the yellow grass that swayed in the dawn wind, Dogeye and those at the head of the column halted, sweeping the wide, flat expanse with sharp, experienced eyes.

It was as fresh and new and empty as on the day of Creation. The brilliant, level rays of sunlight struck far across it, gleaming on the grass blades; and on the distant, snowy mountain peaks. Occasional clumps of trees stood here and there, growing smaller with distance; and slight elevations broke the even monotone of the high plain. Far off, a herd of wild cattle were moving slowly toward water.

"Where's it?" demanded Dogeye, suspiciously. "I ain't see no city!"

"Yonduh she is," said Bunch, pointing southward.

They looked where he pointed. The level surface broke, there on their left. A parapet, as thickly grown with grass as the level plain, rose to a height of fifteen or twenty feet above the surface. At first glance it was negligible to the eye, for its slope was very gradual. Its contour was almost as irregular as that of a natural elevation, but not quite; there remained even yet a haunting suggestion of plan about it. The parapet swept up from an equal and complementary depression in the surface—a depression that followed its course faithfully.

Scattered in front of this moat were a considerable number of low hills—little more than humps—in the plain. They formed a rough double line, a hump in the rear standing between two of the first line, and followed the moat and parapet away toward the southwest. They, too, were grass grown, but in some there were roughly rectangular holes—narrow, horizontal slits, from which the grass had fallen away, and which let in upon blackness.

The war party stood far enough away, and on ground high enough, to observe some of the features of the land beyond the parapet. Higher hills rose inside—hills too steep and regularly placed to be the work of nature. They, too, were grass covered, but the green covering had been torn away in many places—eroded; washed down by rain; or blown off by forgotten winds. In the bare places rustless steel glittered, or begrimed concrete was revealed. In some were black openings which might once have been windows or doors.

Still further beyond the parapet they could see part of another, much wider canyon that cut deeply into the mesa, and which followed a generally southward direction. This canyon was completely enclosed by the parapet—they could see the continuing line of the parapet far off in the southwest, well

beyond the most far-reaching tributary gorges of the canyon. The grass-grown hills inside the enclosure were visible on both sides of the canyon, and were thickest along its rim.

Dogeye stared at this enigma. "Yu call *that* a city?" he said to Bunch. "That ain't no city! Ain't yu never seen one, yu yathead?"

"'Sa city!" insisted Bunch. "Ain't like t'others, but she's a city, right 'nuff! Them there hills, they's buildin's. Got stuff in um—food, guns, clothes. An' the's a hull lot more down underground. Big place down there! Ain't busted up near's much's most cities, either! An' down in that there gut—"

"Where's the gang that druv yu out?" asked Dogeye suddenly, recovering from his surprise.

"Sleepin' back the wall there, like we did, mo' like."

"Back! Ev'body!" shouted Dogeye, furiously. The column retreated in confused haste to the concealment of the stream bed.

"Whut's a matter?" exclaimed Jud, astonished. "Whyn't we go on, captain? Could surprise um now, 'f thu're all sleepin'! Go right over the wall thar, an' kill um right off."

"Could we!" snarled Dogeye. "That Bunch! I oughta bus' yu!" he said to his unhappy guide. "Whyn'tcha tell us 'bout this here city? Leadin' us right spang up to um, 'thout even tellin' us we's there! I oughta bus' yu open!"

"Whut's a matter, capt'n?" repeated Jud. "I don't gitchu. Why cain't we go right on in?"

Dogeye looked his contempt. "They had pickets all 'long here, didn't they? Wurn't *all* drunk, was they? So they had pickets on that there wall, an' they seen us soon's we stuck our heads up like lot gophers! Betcha they layin' back there all ready now—let us have it soon's they see how many we are." He looked at Bunch in helpless exasperation. "Ain't no wonder," he said to him, "'at yo're gang got whut wuz comin' to um! Yo're captain musta been the biggest fool ever, 'fee wuz anyways like you!"

Bunch was not fool enough to comment on this observation.

"Our scouts!" exclaimed Jud. "Jennie was off there on the lef'!"

"Yuh," said Dogeye. "An'

where's she? 'F they got 'ur, Bunch, Um gonna bus' yu!"

Jennie saved Bunch's life by crawling snakelike from the nodding grass at the edge of the dry channel. She was bleeding from a knife wound in the forearm, and two other scouts were with her. Whistles were rising in the clear sunlit air over the wide mesa as the warning was broadcast to the scouts ranging ahead. They would begin converging now toward the column, aware of something wrong, careful to keep below the level of the grass.

" 'Hint the mound, capt'n!" said Jennie. "Whole gang! Near got me, they did! Wuz crawlin' 'mongst them hills when the sun come up, an' firs' thing I know they's four of um snakin' at me! Come outa them hills, they did! Them little hills, this side the mound. They got doors in um! Got one o' the fellers, an' led t'other three out in the grass where Bill an' Ed was waitin'—"

"You was over the moun'—t'other side?" asked Dogeye.

"Shore. Ain't expectin' a gang! Got one sentry up on the mound, this side, 'nen I summon Ed an' Bill an' lef' um there in the grass whiles I crawl up the mound an' down 'mongst them big hills. Firs' thing I see whole gang o' fellers asleepin' that side the mound—"

"How many you think?"

"Wuz 'bout twenty-five them wrop up in they blankets where I wuz. But they wuz plenty more further on. See um when I'm gittin' out."

Dogeye listened while Jennie described her discovery by the enemy, and their attempt on her life. "They didn't wanta shoot," she said. "A sentry up along the mound hissed at um and pointed this way, an' got down off there might fast. Musta seen yu comin' outa the gut. They's waitin' fer us, capt'n. I'm shore sorry I give the show away. Jus' ain't 'spectin' to come on um all to onct like that."

"Yu did good, Jen. 'Sthis fool's fault"—jerking a thumb at Bunch. "Go on back an' gitchur arm fixed."

The lead scouts were coming in now, crawling like Indians through the high grass. They were swiftly apprised of the situation and sent out again. The enemy could not be surprised now, except in the method of attack, and in the size of the force which would be thrown against him. Dogeye did not hurry. First he wanted to know thoroughly what he was up against, and the topography over which he would move.

"That there big gut inside the moun'," Dogeye said to Bunch, pointing to the wide canyon behind the parapet. "Yu never tell me 'bout that! Whyn't yu bring us up that un? Be right in 'mongst um there!"

"Yu cain't come 'at way," said Bunch. "It's all busted—somebody bummed it. The' had a big wall down in there—a dam—with water back of it, and somebody bummed it. It's all down now, and there's

a pretty fair-sized creek runnin' down it, an' noways o' comin' up—"

"Kin they make a stand down in the gut?"

"Nope. There's caves down 'ere; rooms cut right outa the rock. But if they go down there, yu can git at um two ways—down through tunnels from the top an' through doors they got down in the gut."

The columns coming up the other canyons were reporting now. Smoke signals had ordered their advance, and their scouts were arriving. All the enemy's remaining pickets had been cleared with their advance. Dogeye began the encirclement of the "city." The other columns were emerging from gorges further removed from the scene of action: the canyon up which Dogeye's column had advanced was the most direct route to the small, concealed fort. These other columns—three of them—marched, on Dogeye's order, in plain view across the mesa. He would impress the enemy with his strength.

The enemy, for his part, achieved a more spectacular effort to astonish.

Upon the appearance of the three marching columns, rifle fire broke out upon the parapet, and from the pill boxes ranged before the moat. The marching columns, considerably beyond accurate rifle range, ignored the fire disdainfully. They were moving at a swift trot toward the southwest, to take up positions along that face of the defenses.

Now there was visible considerable activity near the center of the long arc of the parapet. Men were moving about, tugging at something on the other side. It rose into view—a light piece of field artillery. There was a busyness around it, and then it spoke—uttered a loud, astonishing bark—and a shell exploded with a bright flash and a burst of white smoke in the direction of the marching columns. Another followed, and another. Although the gunnery was poor, artillery fire was something new, and Dogeye's fighters took cover in the grass, and scattered. But they continued their advance, to the positions they were to occupy.

"Whut yu know 'bout that?" said Dogeye, admiringly. "Thought Bunch was gassin' 'bout a gun on wheels. Listen, none you fellers 'bus that thing with bums, you hear me? We gotta have 'at!

"Awright, get ready! Jud, you take the center. Where's Jennie? Send 'er down there on the lef'. You know how we'll do it. An' take plenty bums, an' don't fergit them humps in front. Fellers in some them. Feed um bums. I'll go through Jennie, on the lef' mos' like. Most of um probably be in the center, 'round that there gun. Listen the thing yappin'," he interrupted himself, again overcome with a genial admiration, already possessive, of the field piece.

"Get goin'," he went on, getting back to business. "There yu are, Jen. How's yu arm? Good! Get goin', Jen, and fin' out how thick they are down there." Dogeye went on giving orders while his column

broke up into well-trained elements.

Within the hour the encirclement was complete. A thin, scattered, double line surrounded the city, and was firing coolly, slowly, and with considerable effect. Further back behind boulders, trees, and low inequalities of the ground, were marksmen. They concentrated so successfully on the exposed field piece that the defenders were forced to erect a barricade for its crew. The enemy's captain, dismayed, knew now that he was dealing with none of the heedless, degenerate, half-mad bands of hoodlums whom he had brushed contemptuously aside in the past. He suspected he outnumbered the attackers, and he had another surprise for them, when they made their charge; but he was taking no chances—his entire force hugged the ground behind the parapet, or stood in the pillboxes, their eyes watchful for other movement in the yellow grass than that made by the wind.

Too, he had greater supplies of ammunition than the besiegers; and it was they who must go down into the moat, and come up that long slope, under the guns of his men. He was reassured.

"Don' let 'em get away!" he yelled to his tribe, cheerfully. "See thar! They got wimmen!"

Dogeye grinned delightedly. "Hear that, Jen? They gonna gitcha!"

Jennie spat, removing a dark blue jacket. Her nude upper body was almost the color of the tawny grass in which she crouched. "They gonna git me awright, but not t' way they think!" A flat pistol in one hand, she crawled into the grass, and was lost to sight. The scouts she commanded, guided by low calls, scattered and followed her.

VI.

Back in the stream bed, at the head of the canyon, Nellmay listened to the firing without much interest. It was an old story to her, and one in which she, before she had given up her gun to take a place in the traces at Tommy's side, had often played a part.

"Dogeye's feelin' um out," she observed. "Hear that racket off there? Thinks he's foun' a soft spot."

"Wish he'd hurry an' git it over," said Tommy. "When we git called, Nellmay?"

Nellmay shook her head. "If he ain't needin' us right bad, we won't git called. That's bad ground to cross—flat, with no cover—an' they got 'at gun on wheels. See us comin' 'ud blow us up."

"Then I'm apushin' one o' the charge wagons," announced Tommy, " 'cause I'm a goin' git in that city soon's Dogeye!"

Nellmay gaped at him. "Pushin' a charge wagon! You gone crazy, Tommy?"

"How I know he don't grab a book soon's he gits in? I'm goin' with a charge wagon!"

"What's amatter of you, Tommy?" demanded Nellmay, angrily. "Dogeye ain't botherin' 'with no books now! He gits in the city, he go all through it, makin' sure nobody's lurkin'. He be seein' ev'thing there

—guns an' wagons an' stuff. Won't bother 'bout books till t'morra or day after."

"I'm goin'!"

"He won't letcha," said Nellmay, with feminine satisfaction at clinching an argument. "Yu ain't strong, an' yu cain't run long!"

"He let me. Be thinkin' I get shot."

That silenced her.

It was getting hotter as the sun rose. The pullers, crouched in the stream bed, and further down in the canyon, were out of the flow of the cool air that swept across the mesa. They began removing their upper clothing. A number of them, long familiar with such engagements, began a gambling game with dice. Precious cigarettes, clothing, and articles of feminine jewelry were the counters.

A scout swung himself down into the stream bed. His face and back gleamed with sweat; his beard, and the long dark hair of his head, were wet with it. On stomach and chest dust clung to the damp skin.

"Three charge wagons," he announced. "Get um ready. Who's pushin'?"

"I am." Tommy got to his feet. Nellmay grunted, and rose with him. The scout stared, but said nothing.

Other women were moving toward the charge wagons, or deciding by lot which would take places behind them. Extra pullers went with the charge wagons, to replace those shot down.

The charge wagons were curious inventions conceived by Dogeye. They were not wagons at all, but four-wheeled shields — frames of metal, sometimes a single, large sheet, sometimes a patchwork of odd bits held together by a crisscross backing of metal or wooden strips, which were hung between two pairs of wheels. This metal shield descended almost to the ground, and rose well above the heads of the men behind it. It was wide enough for eight or ten men to stand abreast behind it, and fire through the small apertures provided for the purpose. Low wheels, in front and behind, carried it.

The shields, carried separately, were taken up to the mesa, and there placed on their wheels, and firmly braced. When placed together, shield and wheels were still light enough to be lifted or carried by the pushers over irregularities of the ground.

Once in view, these contraptions immediately attracted the attention of the enemy. At this distance the range was too great for accuracy; too, the fire from the line of the attackers was a distraction. Still, an occasional chance bullet spanged upon the metal, or whipped viciously through the grass in which the shield's attendants lay concealed.

"Get apart now," drawled the watching scout. "They swingin' thet wheel gun aroun'. You two get over on the right; they tell yu where. Keep 'way back, an' don't forgit to stay apart. You gonna be surprised how thet wheel gun c'n throw um. You"—he addressed the group of pushers that included Tommy and Nellmay—"go on down on the left. Dogeye or Jen'll pick yu up."

The shields separated, crawled away like queer, square-rigged little

boats across the sunlit mesa. The two headed for the right flank went far to the north, circling around. The field piece threw a few futile shells after them, then settled upon Tommy's shield, nearer, and moving steadily closer.

The pushing bar under Tommy's hand was hot with the sunlight. Grass whipped in under the advancing edge of the shield, slapping at his legs, and raising small clouds of dust. He coughed with it. Sweat ran down into his eyes, and was salty on his lips. He wiped it away, and peered out through the gun port before his face. They had a long way to go.

Beside him Nellmay was cursing in a steady monotone. " 'Fwee ev' get there 'sgonna s'prise me!" she said suddenly to Tommy. "Listen 'at gun!"

The field piece was yapping like an excited terrier. The enemy had conceived the purpose of the shields and was flinging ammunition wildly in an attempt to destroy the closest one. Their marksmanship, never good, became execrable. Shells tore up the ground hundreds of yards behind them, and far off on either side.

Suddenly, by chance, one burst quite close, with a frightful concussion that threw Tommy to his knees, deafened him, and set his nose to bleeding. The metal of the shield rang like a bell. Dust, smoke, and a wave of intolerable heat rolled over them.

Nellmay, getting to her feet, hauled Tommy up. Half-blinded with the dust, he groped doggedly for the push bar. "Gotta git thar! Gotta!" gritted Tommy, the bright blood running down over lips and chin. "The' *cain't* git us!"

One of the women laughed. "Don' seem like they kin, Tommy." The next shell had fallen well behind them. "Them yatheads just usin' 'at gun fer diggin'. Wait'll Dogeye gits it! You see some shootin' 'en, 'f'ey leaves any bullets."

The pushers of the other two shields, far away now, observed the situation of their fellows. In a feint they moved in closer, turned temptingly broadside. For a time the gun crew resisted, clung stubbornly to the closer target; then, as the two made an apparently determined advance, the gun suddenly swung around, and in one lucky shot blasted one of the shields into a mass of rubble. Encouraged, it held on the other, but without success. A deterrent was the high rate of casualties among the gun crew: all of Dogeye's marksmen were concentrating on it, and the entire crew had changed in person several times since the action began.

Either the defenders rebelled, or the enemy commander became alarmed at the cost in men of operating the field piece, for it abruptly fell silent. With its loud voice gone, the peppery small talk of rifle fire assumed its former importance. Tommy realized it was more furious all along the line than at any time previous.

The appearance of the ground was taking on that of a true battlefield. Smoke was drifting across it on the

calm breeze, and there were bodies visible along the lip of the parapet, being particularly thick around the position of the artillery piece. Occasional wounded passed them, crawling back to the stream bed and the first-aid wagon. The heat increased, and dust rose to mingle with the smoke. And there was a curious, electric tension present, sensed alike by attackers and defenders.

Minutiae assumed an unnatural sharpness and reality. Tommy found himself staring, almost hypnotized, at a cottonwood they were approaching. A dark head and one brown arm hung down from one of the leafy branches. Dark blood ran down the arm, and dripped from the fingers.

They were close now: the shield was no longer before them, but at their side, for they were moving along the line of the parapet. The wheels, set in swivel sockets, could turn in any direction. They trotted in single file, right hands gripping the push bar. The metal of the shield never ceased ringing, as the bullets struck it.

The woman directly before Tommy uttered a sound between a cough and a grunt. Blood splashed back on him as she crumpled. He tripped and fell over her, and the others over him. A bullet had shot through one of the firing apertures.

She had died instantly. They rolled her body to the side, and went on. The odor of blood mingled with that of sweat and dust. Over it all moved the pleasant breeze, whipping the grass blades, and cooling the ardent heat of the sun.

VII.

Panic struck the defenders as the shield moved down on their right. It was the presence of the unknown, or unfamiliar, probably; and the efficient, businesslike activity of the attackers. At any rate, they revealed the surprise they had been holding in reserve for the charge.

It came as a burst of machine-gun fire, issuing from one of the pillboxes before the parapet and moat, and directed at the advancing shield. The sharp, rapid urgency of the new sound struck through the crack of rifles like an authoritative voice. A half-dozen attackers, Dogeye among them, rose from the grass in surprise, staring. The bullets rang like a tocsin across the moving shield, some whipping through the gun ports, some piercing the shield itself at weaker spots.

Three of the pushers went down, two of them dying, and the third horribly wounded in the face. The others flung themselves down in the grass. Tommy was vomiting: he had seen the woman wounded in the face.

There was a brief consultation among the other pushers, then the quick, sharp crack of a pistol. The woman's wound had been hopeless, and she had been suffering intensely.

Bullets continued to ring across the shield in short bursts, but the pushers were now below the level of fire. Dogeye, accompanied by Jennie and three of her scouts, crawled into view. He counted the remaining pushers, saw Tommy, and cursed viciously.

"What yu doin' here?" he grated.

Tommy went on wiping his face with his hat, ignored him. "You wamble onct when we start, an' yu get it, yu dirty little rabbit-gutted—!

"Yu lay here," he told the others. "We're formin' behind yu. Jen's goin' up root out that gun. Lay here an' don't move till yu git the word. An' keep quiet." He turned to Jennie. "Yu'll hafta bus' that gun fast, Jengirl. Cain't take that nohow. Bust it an' git inside an' make sure she's bust. We get more of um when we get tu books. Maybe we ketch the feller knows how to put um together. Go 'head, Jen."

He sent other scouts to warn the entire line of the possibility of encountering "fast guns," and with orders to locate them if more existed. The shield was still, and the machine gun fell silent.

It was hot there, lying in the grass, and this sector was now quiet. The steady firing came from the center and the right, and sounded far away. They seemed remote from the battle. Nellmay passed Tommy a small canteen, and he drank sparingly. The water tasted sour and warm.

Up ahead, its source hidden by the shield, there came a sudden flash that blended instantly into a series of flashes and was then lost in a torrential up-pouring of white smoke and brown earth. Crashing explosions followed on the heels of the first flash, shuddering against each other. Earth and air shook in chorus; and earth, gravel, and bits of concrete showered down on the sun-warmed grass.

The sounds rolled away and the air was still with a shocked silence. The towering column of smoke leaned away on the breeze, and slowly dissolved. Then, at last, there was a scattering of rifle fire from the parapet, but the machine gun did not speak.

"Jen got um, all right," observed Nellmay.

There followed a long period of waiting, lying there in the close, sun-heated grass. Once, over toward the center, there was a rattle of machine-gun fire; later, a bursting of grenades. The artillery piece boomed furiously for a few minutes, and then was silent again. Tommy watched the shadow of the charge wagon, which had been directly beneath it, begin to crawl across the grass toward him.

And then, far back toward the stream bed, he saw a column of dark smoke rising against the blue sky; rising, and drifting away on the breeze. It was the signal. There was a stirring in the grass around him, a movement, an awakening.

"Luck fer all!" said Nellmay. "Here we go!"

Tommy knew a curious quivering in his vitals, and an empty sensation in his stomach.

There was a sudden wild yelling and a raging violence of rifle fire off toward the center. Grenades began bursting in shattering salvos, their explosions thundering across the mesa — rising and falling over the sounds of the rifles. All along the line the firing picked up, and the yelling, shrill and high, could be heard through it. Jud was charging the center.

A man's bearded face, strained,

soiled, sweat-streaked, poked around the edge of the shield.

"Now!" he told them fiercely. "Now! They's pullin' um away!"

He scurried past them, bent low. The pushers were rising, moving to their places. Tommy was gripping the push bar. And then Dogeye was behind him; men were rising everywhere from the waving grass.

"Go!" yelled Dogeye. "Take it!"

They went. Tommy bent and pushed, staring at his knuckles, white on the push bar. Beside him, Nellmay's strong legs worked like pistons. Rifle bullets began a clatter on the shield.

Behind them the column was forming, sweeping forward, pressing close. In the grass, on either side, unsuspected marksmen, assembled gradually from all along the line, opened a ferocious, withering fire on the weakened defenders of this sector of the parapet.

Tommy was gasping painfully, and his nose was bleeding again, and faster. It ran down into his mouth and choked him. But a wild and contagious excitement bore him on, kept his thin legs pumping. Nellmay was cursing exultantly, and the men and women of the column that followed were yelling with a quick, spaced rhythm that fired the blood.

They hit the moat before they knew they were near it, and toppled over. The shield crashed down upon its face, and they fell on it, and the column poured over them. Tommy bounced to his feet, and ran with the column. Nellmay passed him, her yellow hair flying like a banner. She had a pistol now. Scattered scouts, who had crawled far ahead, were popping out of the grass, joining the flying column.

They swept up the slope of the parapet, and went over it, went through the thin line at its top. Tommy followed, leaping over bodies that were still, and others that writhed, and screamed, or tried to crawl away. He saw Dogeye halt on the summit, fully exposed, yelling frantically. The captain was pointing, howling orders. He ran along the crest of the parapet, and Tommy saw him pistol a man, and leap over his body.

Men and women were going down; crashing down, or crumpling slowly. Screams of agony that sounded utterly inhuman tortured Tommy's ears. He saw a man hit in midstride, and go limp, and bounce when he struck the earth. This last open stretch was the worst.

And then Tommy was at the top of the parapet, and staring down at the "city" inside. He stood there, staring, forgetting the buzzing bullets.

Had he ever seen beehives, Tommy would have said that this city looked like an assemblage of them. There was no uniformity about them; they were scattered everywhere inside the parapet, with a planned irregularity, and were thickest near the canyon that cut through the center of the area enclosed by the parapet. All of them had apparently been covered at one time with the camouflaging grass, although now several were completely denuded of it, showing an earth-stained subsurface of concrete, and all were bare of it in places.

Doorways and windows were perceptible as black apertures. Many of them now framed riflemen.

Streets or roads ran in a connecting web all through this city. These roadways were hard-surfaced, and constructed of some greenish-yellow stuff that approached the shade of the grass. Tommy did not ponder the reason for this: he had never gazed down from a plane, and tried to separate surface features.

The hills, or beehives, varied in size. Tommy's eyes ran over them avidly. Which held the books?

Then he was caught up in the savage action taking place before him. It was climaxing now; flowering into its final, mortal fury. Awakening to his position, Tommy flung himself down, slid over the inner edge of the parapet, which was formed into a breastwork on its inner face. Bodies were scattered along the level walk behind the breastwork, and were tumbled down the adjoining slope, which was less steep on this inner side.

Dogeye's column had darted across this slope, and were now scattering through the beehive houses, spreading out to take the defenders of the center and right flank in the rear. The scouts and marksmen, who were still streaming over the parapet, were attacking the camouflaged buildings. At the same time, the entire line of the attackers out on the mesa were sweeping up the outside slope of the parapet in a furious, yelling assault. Their hideous, animallike, falsetto screaming, intended to terrify, mingled with and was audible even through loud, continuous gunfire and

the cries of the wounded and dying. The defenders were taken in front and behind.

They broke. The men on the parapet, helpless, taken between two fires, began throwing down their arms, putting up their hands in the immemorial gesture of surrender.

As the rifle fire slackened, Tommy could hear Dogeye, far off, yelling, "Prisoners! Prisoners!" The battle for the city was over.

VIII.

The line was pouring over the parapet along all its length. The tribesmen were walking now, the men and women laughing and cheering. Some of them herded prisoners ahead of them. Others cavorted and capered exultantly, and many had adorned themselves with bits of clothing taken from the enemy — caps, jackets, bandoleers.

It was a rich prize they had taken! Lookit 'at wheel gun! They gathered around it, stepping indifferently over the still dead.

Only westward — far off on the right flank—did any firing continue, and that was quickly smothered as the tribe rolled down on it.

Tommy was down in the city now. He had started on a running hunt for the "one that had the books," but the magnificence and mystery of the domes into which he peered made him forget. He went more and more slowly from one to another, peeping through door or window, eyes wide, mouth agape. His tribesfolk ran past him, ignoring him.

Most of the domed buildings were large enough to be divided into several rooms; some, indeed, possessed two stories. Tommy discovered to his baffled astonishment that the grass with which these domes had been covered was artificial! It was not grass at all, but a flexible, fibrous stuff, very evidently man-made! And doors and windows at one time had shutters sheathed with this stuff; shutters which could be lowered into place, giving the domes a complete appearance of grass-grown hills. Few of these shutters remained in place, and all of those that did were torn by bullets or grenades.

The first of the domes into which he stared had been living quarters: there were bunks set against walls; there was furniture, mostly wrecked or rotted — tables, and chairs, and kitchen fixtures which had once been white and gleaming but were now soiled, smeared, splintered. Incomprehensible gadgets and machines flanked walls — a radiator, an oven, with thermostat and other controls, a built-in radio set, and in another room, a telephone, badly broken. Tommy had never seen or heard of such things.

He wandered on, dazed, astounded. The old ones! What they had known! What they had been!

Pillboxes, and small forts showing ruined stumps of guns, he understood and passed by. But then he found what had once been a large garage, and stood in the great, shattered doorway staring in unbelief at the array of "wagons" it still held. So many! And yet he could see that it had been built to hold many more! He went on, from mystery to mys-

tery. Here were rooms filled with machinery; with smashed panels, sprouting wild tangles of wire; with wheels, and pipes and objects for which Tommy had not any name.

The dust was settling, and except for the occasional mercy shot, all firing had ceased. The wagons were coming in now—the ammunition wagons, and the first-aid carts—and were being unloaded. Dogeye had another use for them now. While well-ordered gangs raced through the city, exploring, searching for any last guerrillas, the others turned to the removal of the dead. They grumbled but obeyed — Dogeye was a strict master, but he won their battles. From bitter experience he knew he must take no least chance of disease —the dead must be buried.

Tommy was pressed for this service, along with all the other pullers, and those fighters not required for policing or for guarding the prisoners. The carts began moving through the city, gathering the bodies, taking them out upon the mesa. The defenders, Tommy saw, had lost heavily — well over half their force, he judged. He was pulling beside Nellmay. Others walked beside the cart, piling the bodies in it. And out on the mesa other men and women were digging a common grave to receive them.

"Yu fin' the books?" Nellmay whispered to him.

He shook his head. "But Dogeye ain't lookin' fur um yet, either. He's seein' t' all this here. See um? 'Head there."

They were moving westward along a road that followed the line of the slowly curving parapet, and were approaching the concentration of prisoners. It was much easier, pulling the carts along these smooth roads.

"Tol' yu he wun't bother 'bout books," said Nellmay.

"Yeah, but I couldn't be sure—"

They were interrupted by a shout from Dogeye. They halted, gazing toward him. "Bring um out here," ordered Dogeye, and a man was led through the line of guards surrounding the prisoners. He was a tall, heavily-bearded man with a look of stupefaction and defeat on his face. It was the enemy commander. He was fortunate in his stupefaction, in his dazed inattention, for, when he was close to the death cart, Dogeye pistoled him through the head. It was unexpected and quick.

"They ain't gonna be no two captains in this here gang," announced Dogeye. "Not even a ex-captain. Throw um in there, you fellers."

The body was flung in Tommy's cart.

The livid hate in Tommy's eyes was like a —wild cry. Nellmay saw it. "Gitchur head down! Quick!" she ordered in a tight whisper. Tommy obeyed her instinctively, and was fortunate that he did. Had his captain seen the look that had been turned upon him, the cart would have received another body.

"Git along," ordered one of the guards. Dumbly, Tommy and Nellmay pulled away. Dogeye was addressing the remaining prisoners, offering them their lives, and a place in the tribe. They would be pullers, toilers—slaves—at first, freeing all

of the pullers save those who preferred pulling to fighting, and a few of the most experienced who would remain to direct. Later, as they proved their loyalty, and their ability with guns, they would be given full rights in the tribe, and might fight or pull as they chose. All of the prisoners accepted.

It was close to sunset before the last of the bodies had been placed in the grave, and the grave filled with earth. It made a great, raw mound out there in the quiet grass—a mute and terrible accusation. The upturned earth looked red in the level, sunset light.

The new slaves, carrying the shovels with which they had buried alike their former comrades and their recent enemies, were streaming slowly to a new camp, out on the mesa, away from the city. The tribe would not sleep in the city—at least, not at first. It was strange, different; and they were used to sleeping under the stars, unconfined. And a lingering, or a growing, superstition warned them away. In a few days they would grow accustomed; the eerie stillness of the city, the powerful suggestion of its long-absent owners, would cease to disturb them, or disturb them not as much. Until then, they would not sleep there, nor would they permit the prisoners, with no such scruples, to remain alone within the city.

Tommy, leaning wearily on the cart, watched them go, then turned to stare at the blank and silent parapet. Death had not changed it; death and blood and pain left it as before —a quiet green slope, across which the wind moved. He sighed, staring, confused. Tommy was only a boy, who knew no history, who knew little of anything, because the guns had talked so loudly they had drowned out all the rest.

"Here comes the folks," said Nellmay cheerfully, beside him.

Those of the tribe who had been left to guard the caravan in the cleft out on the desert were now streaming out of the three canyons which the war party had traversed the night before—the night that now seemed so remote. Scouts had raced back to them when the fall of the city was assured, and all afternoon they had been toiling up the gorges, dragging those "wagons" which were judged capable of passing through the gorges. The remainder of their vehicles had been left behind in the cleft; camouflaged, covered with desert vegetation, so that their outlines would not attract the eye of any wandering band.

Other scouts were stationing themselves all along the nearby rim of the mesa, as guards of the first night watch. A larger force had already departed, heading west, to explore the entire upland area, and to make sure that no other tribe was on the plateau.

Before the night had come a good part of the original caravan was strung across the grassy field before the parapet. Fires were being lighted, and the odor of cooking meat, drifting on the dying breeze, spurred appetites already strongly active.

The police and exploration squads were coming out from the city,

bringing booty they had caught up as they went — tinned food, new guns, clothing, and even a rare, occasional tin of preserved and priceless cigarettes. All alcoholic liquors found were commandeered by Dogeye, to be doled out sparingly. He had snuffed out too many bands, helplessly drunk on a chance-found cache, or on crudely self-manufactured stuff, to permit such orgies in his tribe. He, himself, abstained entirely from alcohol.

As the tribe collected around the fires the voices rose — loud, sharp, self-assured, and self-satisfied. The tale was told and retold, the victory recounted; the boasts of violence and the delivery of death, the boasts of bravery, of reckless courage, were made while the wide and stage-blue sky slowly darkened and the stars began again to flame and sparkle. There was exultant laughter, and there was weeping. It had all happened many times before.

Tommy and Nellmay found Gram-mom and their cart. They ate, and then — (Nellmay grumbling) — got fresh clothing, sought out the tiny stream that ran down the furthest canyon, and washed as well as they might. It was colder, up here on the mesa, and Tommy was shivering and Nellmay cursing when they got back to the fire.

"Um gonna sneak inta city," mumbled Tommy. "Fin' t' books."

"Yu gotta wait for me!" snapped Nellmay. Her hair had gotten wet, and Gram-mom was slowly brushing it dry. "You gonna wait fer Gram 'n' me!"

But by the time Nellmay's hair was dry, Tommy was deeply, soundly asleep. The two women wrapped him in blankets, and crawled into their own. Gradually the voices died, as the tribe went to sleep. The increasing night was left to the distant song of the coyotes.

IX.

With morning the real investigation of the city began. It was a morning like the others — brilliant, clear, with a sharp, cold, invigorating breeze moving. The air was transparent for miles, and all but sparkled with the dazzling sunlight.

The prisoners were corralled outside, with a cordon of guards. The remainder of the tribe, breakfast finished, poured into the city.

Dogeye selected as his personal headquarters a dome which had been an executive office. It contained several desks, in fairly good condition; a few chairs, less well preserved; and, along the windowless dividing wall, tall, battered green file cases holding a voluminous card-index system. The place was cleaned of its accumulated rubbish, and Dogeye took possession; Tommy, Nellmay, and Gram-mom, wandering wide-eyed, peeped in a window and saw him, seated at a desk, receiving reports from his lieutenants, giving orders.

The file cases attracted Tommy's attention. Several had been badly broken open, revealing the massed ranks of cards.

"That writin'?" Tommy asked. "On them big hunks o' paper in there?"

Gram-mom peered, squinted. "Looks like ut. Hafta git closer tell whut 'says."

"We sneak in here t'night, an' fin' out," said Tommy. "Might be like books."

They went on, marveling, past ruined machine shops, repair stations, dwelling places. They went from brilliant outdoor sunlight to shadowed, forsaken rooms, long empty, that were loud, for the understanding eye, with mute messages from those who had once lived in them. A child's toy, broken on the floor . . . a glove, left where it had fallen by other explorers or that it was too worn or damaged to be of use.

A few of their tribesfolk wandered as did Tommy and his companions, led by amazed curiosity. But the practical majority had more definite ambitions.

They sought the storage vaults, broken open, ransacked, by the several wandering bands which had found this city, but still well stocked with clothing, preserved food, firearms, and a multitude of objects that had been necessities to the founders of this community, but whose very purpose defied these night-enveloped inheritors.

Skin creams were tasted, under the misapprehension that they were a kind of preserved food; a photographic enlarger was studied with profound seriousness, in the belief that it was some kind of weapon, deadly and mysterious; telephones and radios received but blank stares, or were broken open in childish curiosity to see what was inside.

Cleansing powders, polishing fluids, ink, electric bulbs, musical recordings, vacuum cleaners, electric toasters, and the million-and-one gadgets and parts requisite to twentieth century civilization came in for their share of bewildered, uncomprehending attention.

Gram-mom grew sick of the cry, "Read me whut this here says," and of slowly and with difficulty deciphering such instructions as "Wet the article to be cleaned, sprinkle lightly with Linide Powder and rub with a damp cloth or brush. Then rinse surface and wipe dry." She warned them away from any container displaying a death's head, and told them to taste nothing which they were not positive was food. Despite her warning, several members of the tribe became seriously ill from ill-advised sampling.

The three explorers followed their tribesfolk underground, and found fresh wonders at which to gape. Another, a different city, lay down here, and a multiplicity of rooms crowded with machinery. Besides these, there were lecture halls; game rooms; a bomb-wrecked and long-dry swimming pool; a theater, for motion pictures and dramatics; an art gallery and museum; and, deepest of all, and probably of greatest interest to the tribe, an enormous arsenal. Over this armory Dogeye had set guards, and each individual was permitted to take only sufficient arms and ammunition for his personal use.

All of these rooms were connected by wide boulevards, arched of roof, and lined with white tile.

Penetrating bombs had destroyed parts of this system, and grenades had wrecked more, but it was, relatively, in good condition still. It had once been electrically illuminated. Now Dogeye's warriors carried torches, or crude, homemade oil lamps, and fires burned at intersections, and in large rooms where the tribesfolk gathered. Excellent ventilation, still in good repair, carried off the smoke, and sent cool air moving through these passages and boulevards.

Each of the surface domes had a shaft, laddered, or with stairs, that led down to a slanting ramp or passage that, in turn, joined a lower boulevard. It was by one of these that Tommy and his two friends found their way to the lower city, Tommy carrying a torch of grass and slow-burning wood, Nellmay with a further supply of fuel to replace it when it had burned away.

They wandered on, drawn from marvel to marvel, until they were far beyond most of their tribesmen. Now they passed only guards, set at strategic points by Dogeye's lieutenants. Ahead Tommy saw daylight. They went toward it, extinguishing the torch.

They entered a wide boulevard that ran along the sheer face of the central canyon—the canyon whose upper reaches they had observed the day before over the crest of the parapet. The rock wall had been broken through in a series of great arches, like a balcony, but few of them now remained undamaged. Bombing had been more furious here than at any other spot they had passed, and the ruined gallery was torn almost entirely open. They leaned on the broken parapet and stared down into the canyon, whose depths, in the noonday sunlight, were brightly lit. It was a scene of wild devastation, although the greatest ruin had been wrought in the lower reaches of the canyon, on their left, as they could see by leaning far out. The floor of the canyon was covered with rubble brought down from the walls by bombs; in turn, bombs had fallen upon this wreckage, shattering it further, but the craters formed had filled with slides, and later erosion. A wide stream, almost a river, found a tortuous way through the maze of boulders and debris, and formed foaming pools in those craters not yet entirely filled up.

On their right, as the river bed rose to the level of the mesa, the marks of bombing diminished, and the canyon narrowed. On its opposite wall they could see balconies and windows cut through the solid rock, and broken stairways and metal ladders leading up and down the sheer, rocky face. They turned to their left, to discover what it was that had been the object of such ferocious bombing.

The shattered gallery led on and on, until it vanished, almost completely destroyed, and they followed a narrow ledge under the open sky. There was little danger of landslides—bomb-weakened rock had long since crumbled and fallen.

What remained was solid bedrock, attacked only by natural erosion.

They were almost in the mouth of the canyon, and could see out across the still and sunlit desert, before they finally came upon the objective of the bombardment. It had once been a huge dam and reservoir, but so furious had been the attack little remained that was recognizable, and it offered now but slight impediment to the broad stream that poured across its ruins and out upon the thirsty desert.

"Lawks!" said Gram-mom, surprised. "Thought 'twould be wheel guns and big guns they'd be bummin'. This here's jest fer wateh. Wonder whut fer they choose to bus' this all up?"

"Jus' mean, like Dogeye, 'spose," said Tommy. "Less go back. Ain't nuthin' here."

Gram-mom shook her head. "Dogeye's mean, but he ain't throwin' bums jest to pleasure um. They wuz bummin' this here fer sumpin' 'sides meanness."

On either side of the dam, where it joined the wall of the canyon, were rooms sunk in the rock, now blasted open and revealing masses of almost disintegrated machinery. The dam had served as a water reservoir for the vanished community; but it had also had a more important purpose—power. It had been actually a hydroelectric plant, supplying the city with sufficient current for light, heat, and the other essentials.

But this was something neither Tommy nor Gram-mom could have understood even had the plant been in actual operation at the time of their visit.

They returned to the city more quickly, knowing the way to be safe, and passed the point at which they had first looked out on the canyon. The gallery ended just beyond this point, and they relit their torch, entering one of the wide boulevards that still followed the line of the canyon, but which was set fifty or a hundred feet within the rock.

They trudged on, peering into the rooms that opened off the boulevard. Those on their left had windows looking out on the canyon, and were well lighted, for the level was rising with the canyon floor, and more light was in consequence admitted.

Abruptly Gram-mom halted, before a door on the left. "Hol' up yer light, Tommy," she ordered. Tommy raised the torch, and its light flickered upon an inscription over the doorway. Gram-mom studied it. At length she said, and for the first time there was something of awe in the pert old woman's voice: "Tommy, looks like yu foun' whut yu lookin' for."

"Huh? Whut? Whut's it? Read it, Gram!"

"It's the li-brary—place where they kep' they books. See them big letters up top? Spell li-brary. You c'n read 'at, Tommy."

"C'n read it, but I din't know whut it meant. Nor t' res' of it, either. Read the res' of it, Gram, underneath."

"*'Fort Goodhope,'*" Gram-mom

read slowly. "That's the name of the city. An' under that's *'Izolashionist—'* That ain't right. *'Isolationist.'* That's it! *'Isolationist Post Number 43. Foun'ed for the pres'vation of our rights as free men, for the defense of our liberties, and for the per . . . perpetuation of our civilization. A. D. 1965. May God defend us.'"*

X.

The three stared in silence, while the letters leaped out of shadow or sank back into it as the torchlight flickered.

"Whut's all that mean?" asked Nellmay, uneasily. "Sounds funny."

"Don't rightly know whut all the words mean," said Gram-mom, "but I figger they come out here to git 'way f'm the bummin' an' all. Figgered they could fight off fellers like Dogeye. The other gang musta follered um, or foun' um out after. Somebody bus' um, anyways."

"Whut's 'at 'A. D. 1965' mean?" asked Tommy.

"'At's the year they built this place, yu ninnyhammer! Ain'tchu know whut a year is?"

"The years had *numbers?*" exclaimed Nellmay, very much surprised.

"Shore! Counted um f'um the year Our Lord was born."

"Wull, then," asked Tommy, "whut's the number of this here year?"

Gram-mom was silent for a moment, then she said: "Usta know, Tommy, when I was a little girl, but I ain't remember no more. Travelin', fightin', havin' kids, roamin' all the time, never sittin' long anywheres I fergit. Tried to keep count fer a spell, but it warn't no use. I'm an old woman, Tommy, an' I don't mind right no more. Usta know the year I was born, but 'sall gone now. Too long ago when I knew, an' too much happen 'tween. Come on—let's go in an' look at the books."

They walked into the wide room beyond the doorway, staring wide-eyed about them, all of them very much subdued.

The room was well lit by a series of great, arched windows, some few of which still retained an occasional pane of grimy, opaque glass. Around all the walls were shelves, rising almost to the lofty, shadowed ceiling. Along the windowed, canyon wall stood long tables. Several of them had been willfully broken up by vandals, and empty spaces suggested that others had been removed, probably for firewood. The center of the room was occupied by ranks of tall bookcases, many of them overturned, and a few more tables. Broken electric fixtures were everywhere—they had apparently aroused an irresistible curiosity in each visitor to this dead library, and had been twisted, broken open, shot at, and often torn out by the roots.

The floor was a wild litter of books, of all kinds and sizes, and in all conditions. Singly and in heaps they were scattered about, slowly dissolving to dust. Some were burnt, some marked by bullet and knife, some viciously ripped

and torn, and apparently by hand, in sheer vandal lust for destruction. So many were thus flung about upon the floor that Tommy marveled that any remained on the shelves; yet to his eye those shelves seemed crowded. Its depth underground, and the out-of-the-way position of the library in relation to the other parts of the community, alone had saved books and wooden tables from complete destruction by fire. Once or twice wandering bands had apparently camped there in the library, and used books and woodwork for their camp fires, for the marks were plain on the floor. But the naturally frugal nature of the campers had spared the vast majority of the books; and chance, together with the penetrating, aged, moldy dampness of the volumes, had saved them from accidental burning.

Tommy bent and picked up a thick tome. *"Procedure Handbook of Arc Welding: Design and Practice,"* he spelled out incorrectly and with difficulty. He dropped it. It meant nothing at all to him.

Nellmay, who could read not at all, fingered a treatise on the *"Plastic Working of Metals,"* staring blankly at diagrams and illustrations which were perfectly incomprehensible. Gram-mom had one entitled *"Sketchbook of Mechanical Movements."* She exchanged it for *"Growing Plants in Nutrient Solutions,"* which revealed such chapter headings as *"Mathematics of Solutions," "Technique of Nitrogen-potassium Balance,"* and *"Plant Chemiculture."* As they moved instinctively toward the windows, where the light was better, they turned over or glanced at a multitude of such volumes, as meaningless to Gram-mom as though written in a language other than English. Some, however—much simpler works on agriculture—she bundled under her arm; with study they might become understandable.

"Fust thing we gotta fin' is dicsunary," she told Tommy. "Cain't git nowheres 'thout that."

"Whut's it?"

"Book tells yu whut words are—whut they mean—Gotta fin' one."

They entered an area of children's books—simple histories, and books of general science for older children—and Tommy, utterly fascinated, became lost in them. Bits of knowledge, glimpses of a tremendous story, tantalizingly half-revealed, half-obscured by his rudimentary ability to read, tormented him until the sweat stood out on his lean face, and dampened his fuzzy, youthful beard.

"Gram-mom! Whut'siss mean? Lookit!" became an almost constant slogan, but Gram-mom firmly persisted in her search for a "dicsunary." She found one at last—a huge, ponderous volume far too heavy for her reedy arms, and Nellmay sprang to help her. The girl, too, was caught up in the unfamiliar excitement, and was demanding that she be taught to read, as though it was some kind of secret which could be revealed to her in a few minutes. She car-

ried the dictionary to a table, directed by Gram-mom, and stared with pathetic hopefulness at the opened pages. They were as incomprehensible as the others. She wandered away, despairing, to the shelves, and in idly plucking at the volumes, came upon an entire shelf of picture books—bound volumes of photographic magazines, profusely illustrated in color, and in subject matter as wide as the dead world which had given them birth.

Nellmay was stunned with delight. It was as though she had been blind from birth, and now could see! She stared as though she would consume the pages with her eyes, and leaped from book to book and page to page in a fever of excitement that brought the hot color to her young cheeks. Suddenly she burst out, "Gram-mom! Tommy! Lookut! Lookut what I foun'!" The two came over without excitement; and were, in turn, caught entranced by what they saw.

They stared, utterly dumfounded, at the civilization from which they had descended—at buildings, incredibly tall, glowing with color; at airplanes, automobiles, streamlined trains, at homes and gardens and great personages long since forgotten; at street scenes which were to them as fabulous as scenes from another planet; at animals whose existence they had never suspected, and could not credit; at weapons so vast and complicated they never knew them for weapons—at all the kaleidoscopic, incredible fanfare and riot of a civilization that had towered and flourished and swept up into the sky, and then vanished in a breath.

Books all around them were calling imperatively. There was a fever in their blood; the lust of discovery was like wine in them, and they were getting drunk with it. They ran from one end of the room to the other, trying different cases, bringing armloads of books to the tables, poring over them, or racing through; flipping this one open, leaning close to that one, as though to peer far into the perspective of a photograph—caught, held, by strangeness, or a haunting familiarity, or by sheer beauty.

A tremendously magnified, telescopic photograph of the moon, in an elementary astronomy, electrified them as might Gabriel's Trumpet. They knew what it was: Gram-mom read the caption, and they knew the moon well, perhaps better than those ancestors of theirs who had lived among these wonders. But to think that that brilliant white mystery that sailed through the sky could look like this—! And how did the old ones get close enough to see it that way?

"Didn't," explained Gram-mom. "'Slike them there things Dogeye's got—fiei' glasses—oney bigger, 'way bigger!"

The bits of text that Gram-mom read them stirred them as must have the southern ocean stirred Balboa, when, from that peak in Darien, he saw it first. The earth a planet, moving around the sun! And that moon! It swung around the earth, now on one side, now the

other, and that accounted for its changes of shape!

That timeless door, opening upon an endless road, a road ever more magnificent—that door that had swung open for so many now opened for Tommy, and Nellmay, and Gram-mom: they heard that call of knowledge, of I-want-to-know, that has trumpeted across all the centuries of Man's existence, fainter at times, perhaps, but never quite dying away. Mystery, and beauty, and boundless freedom in time and space rose from those aging volumes, flowered in splendor, filling the room like a celestial spirit. They shared an experience that none of them ever forgot.

And then suddenly Tommy was silent, utterly unmoving. He was still for so long—his gaze was so fixed and intent—the two women came to him, and peered over his shoulder at the book that he held.

The shadow of the opposite wall of the canyon was creeping further into the room, for the sun was moving down the western slope of sky; but upon that open page there was no shadow—there was nothing to soften or conceal the naked horror pictured there. The rich evening sunlight fell upon the photograph like a spotlight, illuminating it brilliantly.

A bomb shelter, wrecked, and strewn with torn bodies. Rescue squads trying to dig out survivors. In the foreground a child's body, its face a shredded black mask of blood, featureless . . . its arm—

Slowly Tommy turned the page. Another photograph—a ruined city, wrecked walls, more bodies, men in uniform, with masks upon their faces, guns in their hands, running, blind to the horror underfoot.

The pages turned more quickly. They saw tanks, multitudes of tanks, firing, moving beastlike through white smoke; they saw armored cars, and planes, and great, incredible ships, belching flame; they saw men struggling in water; men on machines that squirted liquid fire; men dying in numbers beyond Tommy's conception; they saw armored and shielded guns on wheels blasting at houses; they saw fleets of planes over cities, methodically bombing them out of existence; they saw a fury of destruction that made Dogeye's most wholesale massacres seem trifling.

The two women stared at Tommy, almost frightened by his expression. He went on, still wordless, pulling down other volumes from the shelf on which he had obtained the first of these. In a half hour he had traveled across the world, and seen the ruin of half of it; had watched his race committing suicide in a flaming hell of self-destruction that was like some nightmare of World's End. It was Savagery glorified; a Satanic Passion, supreme and limitless.

The light was almost gone; the shadows were rising swifter, thickening in the corners, and in the high ceiling. Tommy dropped the last book upon the table, and stared at the silent room.

He said, softly: "They had so much . . . they could do all 'at . . . fly, and make things go on wheels, see far, an' know s'much . . . an' all they think is killin'! *Killin'!* Jus' t' take stuff f'm other folks, er keep it f'um um! When they coulda help't um . . . coulda healed um 'steada killin' um— We ain't fit, Gram-mom! We ain't *fit* t' know! Yu see it, Gram-mom? Dogeye, an' all t'others—they'd do jus' t' same, did they know how. Ain't no different, none on um. 'S better we don't know, like I tol' Nellmay, 'cause, not knowin', the' cain't kill so many, er so quick. Dogeye cain't reach um all; some folks'll git a chanct t' live along, 'thout bein' bothered.

"So it's better we don't know! Um gonna bus' it all. The' ain't gonna *be* no books!"

XI.

The two women stared at him. Tommy was more than Tommy now —he had come into the heritage for which he had been shaped from birth. His head was high, his youthful body firm; his eyes looked beyond. The mantle of the crusader had dropped upon his thin young shoulders.

"Yu gonna git kilt, Tom!" whispered Nellmay.

"Ain't do no good," said Gram-mom. "The's other cities, ann more books. Folk'll git um—"

"Folks ain't Dogeye," retorted Tommy. "Lookut this"—he waved his hand, indicating the ravaged room—"most folks jus' use um for settin' fires. They bus' um, tear um up.

"Dogeye's the one, an' fellers like um. I'll go amovin' all over here —keep atravelin',—an' ev' city I look fur books, an' bus' um when I fin' um. Ain't many lef', oney in places like this here. We come through lotsa real cities, an' ain't fin' one—all burnt, er bummed, er rotted away."

"But the's oceans, Tom, an' lands beyont um! Yu ain't fergit what I jest read yu! Maybe the's books in them lands! Maybe lots on um!"

"Maybe ain't is. An' folks is lot alike. 'F yu gonna maybe, maybe the' ain't no folks lef' atall in them lands—ain't many lef' here! An' maybe I git to um. Ain't never see an ocean, but I'll git t' see um. An' maybe I git across—folks did. Leastways, I'm gonna stop Dogeye, an' he's right here! Good-by, Nellmay. Good-by, Gram. You git on back t' camp."

"Ain't!" stated Nellmay. "Goin' with yu!"

"Yu *cain't,* Nellmay! Yu gotta—"

"Yu think Um gonna let yu go wanderin' off by yuse'f, an' git kilt firs' thing right off! Um goin' with yu, Tom! Um takin' a gun, an' I'm yore gang, an' yu cain't stop me! Now, whut yu want I should do first?"

Tommy stared at her helplessly, and Gram-mom's face wrinkled in a smile that was quickly suppressed.

"'F you go, she goes, Tom. Yu might's well 'cept it an' git on.

Whut yu takin' with yu? Yu'll want s'pplies—wateh and food—tu last yu till yu git time to kill some game. Yo're gonna travel fas' and far at first, yu know, Tom. Dogeye'll be after yu, an' he won't quit easy. He's gonna be mad 'bout these books—set a store by um. Yu gonna travel fas', so yu cain't take no wagon—"

"U'll hole up some'ere in the mountains, till he's gone, an' nen come back an' git stuff."

"'At's a good idear, if 'e don't fin' yu out. Well, yu cain't take no clothes 'cept whut yo're wearin'. Be food an' ammunition yu'll want, an' some cans fer cookin'. An' matches. They foun' a store o' matches t'day; I'll sneak some. I'll git back t' camp, Tom, an' c'llect the stuff fer yu; I'll hide it beyont camp—over yonder where the buryin' was. Yu know that big tree further out? Where Jackie got kilt snipin' yest'day? I'll put it undeh that. I'll git yore rifle, Nellmay, that yu kep' hid the's bullets here that fit it—saw a case with the name an' numbeh on it. Now how yu gonna bus' the books, Tom? Wanta know 'fore I leave."

"Bum um," said Tommy. "Soon's it git dark an' they all go back t' camp I'll pile lotta bums here an' set um off."

"How yu gonna set um off?"

"Why, same as always—pull the little plug out, and run!"

Gram-mom shook her head. "Thought that's the way yu was figgerin'. 'Twon't do, Tom. Yu heap 'nough bums here to bus' all this, an' nen set um off with a han' bum, yu'd never git off alive. A bummin' like 'at 'sgonna bring down the rocks all 'round here, an' yu'd never git up t' the top 'fore she went off. Yu'd git caught in the tunnels. Whatcha want is a time bum. Some in the arsenal: saw um when we went through. Yu set a time bum couple hours ahead, an' it gives yu plenty time t' git out, an' plenty time to git well away, too.

"You kin read what it says on a time bum, Tom. Here, I'll write it out fur yu, 'bout the way I seen it in the arsenal." She tore a blank sheet from one of the books, and taking a stub of a pencil from a pocket, printed neatly the words "Time Bum," and followed them with brief instructions for setting it. She added a small drawing of the bomb, and marked the controls. "Now you read 'at to me."

Tommy slowly read what she had written.

"Yu unnerstan' all that?" He nodded. "Now you take care yu make no mistakes! You watch um, Nellmay, 'cause 'f'ee does anything wrong ain't gonna be nuthin' lef' of yu!

"Now, whut 'bout the little papers in the boxes where Dog-eye is?"

Tommy slapped his hand down on the table. "Fergot um, Gram! Hafta go up 'ere an' read um. Go up with you now."

"Don't hafta, Tom. You go fin' the time bum, an' Nellmay'll go up with me. I'll tell 'er whut they is, an' she c'n come back an' meetcha in the ammunition room. You go ahead now; git up t' the arsenal. Be dark by the time yu git there, an' they'll all be gone. Here, Nellmay, light um a torch."

She kissed him when he was about to leave, a caress to which Tommy submitted with some surprise. "Wish yu'd fergit 'bout bustin' the books, Tom." He started to protest. "I know, I know; yu gotta do it. That's the way men is. But yu seem jus' like one of my own kids—known yu since yu was a litle crawler, when we foun' yu with yur dead ma. An' I ain't never kep' none of my kids, never. They git kilt, or they grow up an' go off on their own, er join some other gang, er just die. Ain't got none, anyways. An' now yo're goin'. Guess I oughta be use to it, b'now. I'll meetcha at the tree when yu start."

Gram-mom patted Tommy's shoulder, and pushed him off, out in the corridor, watched as his flickering light diminished. Then she turned to the room and began swiftly collecting a number of the books, piling them by the door.

"Whatcha doin'?" asked Nellmay.

"Savin' some of these here books for Tom. We'll hide um some-'ere, where you kin fin' um after Dogeye's lef'. Some'ere up top."

"But," exclaimed Nellmay, outraged, "Tom wants to bus' um all!"

"Thinks he do, now. After while he gonna be sorry. 'At's the way men act, Nellmay; yu gotta learn 'at! Tom wants to know, wants to read, an' after he git over this here, he gonna wish he had 'ese books. When yu come back t' the city after Dogeye's gone, yu git these books fer Tom."

"But Tom says it's bad to know—makes fer killin'!"

"These books I'm savin' don't make fer killin'. Anyways, if he wants to, he kin bus' um when yu come back, cain't 'ee? He won't wanna bus' um then, you see!"

"Whut they 'bout, them books?"

"'At's a jogriffy—tells about the land, what shape it is, an' where places are. Tommy kin read it. An' 'at's a dicsunary. Tells whut the words are. This here that book 'bout the stars an' all, 'at I was readin' to yu from. An' them books is all 'bout growing things; tells yu how to know um, an' how to care fur um, an' how to fix um fer eatin'—"

"Ain't gonna do it!" snarled Nellmay, brows drawn down fiercely over hot brown eyes. "Tom want um bust—"

"Lookut, Nellmay." Gram-mom held one of the picture books up to the torchlight. It was one of those without war photographs; one of those containing photographs of homes, gardens, and beautifully dressed women. "Saw yu lookin' at this here. Wanna save this one, too? Ain't nuthin' 'bout killin' in here."

Nellmay stared, her expression changing. Her red lips parted a little, and her brown eyes lost their narrow glitter. And, like other women before her, she capitulated. "Awright, Gram. We hide um, an' if Tom wants to bus' um he kin when we come back." She took the picture book and hugged it under one arm. "But whut yu want wi' them books about growing things? We ain't growin' nuthin'." She shook her wild, bright mane of hair exultantly. "We's goin' far; goin' all over, roamin', Tom an' me. Goin' see all the land, fur as it goes!"

"It ain't no good, Nellmay. Whut good is roamin'? Jus' keep on atravelin' till somebody bushwhacks yu, an' the wolves git yore carcass. Listen, Nellmay, I been awanderin' all my life long, an' now I'm old, an' whut's comin' fer me? Nuthin' but a bullet!"

"A bullet! Whut yu mean, a bullet?"

"Shore! Dogeye's gonna kill me, soon's I learn um readin', ain't yu see it? Whut good um I to um? Cain't fight. An' 'twon't be s'long till I cain't keep up with the wagons, an' yu think he's gonna let me ride, an' eat, an' do nuthin'? He'll shoot me, like I said, er leave me by the trail tu starve! Shoot, most like, 'cause he got it in fer me. I'm sneakin' off soon's he pulls outa here; I'm leavin' um!"

"Leavin' um, Gram-mom! Where yu gonna go? Yu'll die, Gram, less yo're with the folks!"

"Comin' back here, thass whut! The's food, an' wateh. 'Nuff p'served food to las' me a year, I reckon, iff'n I c'n kill some game to piece out. An' in a year you kin git Tom back here—maybe onct he sees these here books, he'll never start awanderin'. If he does 'sist on goin', you git a kid quick's you can. I know Tommy; he won't wanta chance his young one gittin' kilt—he'll come back! An' the three of us kin start growin' things. Saw veg'tables run wild out beyont the breastworks. We c'n make um grow right agin, with these here books. An' I bet the's seeds in this here city some'eres. Bet they got seeds put away same's food an' guns, an' all the rest."

"We wanta go roamin', Gram! We ain't wantin' to set!"

"Yu want Tom kilt?"

"No!"

"Then you do like I say—bring um back here, quick's you can!"

"But whut's a use of growin' things, Gram? Gangs'll come, bigger'n we c'n fight, an' take ev'thing we grow, an' kill us all, too!"

"Not here they won't, Nellgirl. Ain't many more gangs comin' through here.

"I'm an old, old woman, an' I been travelin' many a year. I seen a lot. I been watchin' an' figgerin' all that time, too. Whut's these wanderin', roamin' folks livin' on? They lives on the past, that's whut. They goes traipsin' f'um city t' city, livin' on food p'served 'fore I was born. More'n half of um has something wrong with they heads —cain't think right. They never grow nuthin'; don't know how, cain't learn. An' when they cain't fin' p'served food, er ketch game, whut they do? Eat each other, thass whut! Seen um! Near et me, onct! Oney a few I ever see, like Dogeye, doin' any figgerin'. An' then like Dogeye's gonna stick near the cities, the big cities, an' build up they gangs much's they kin, so they kin be boss over all. Wind up in one big fight where ev'body gits bust!

"An' the little gangs ain't nev' gonna git this far 'way f'um cities —they starve, an' die, an' kill each other fust. You seen um—don't take wagons with food an' wateh an' stuff, like Dogeye. Ain't got that much sense. So all's gonna be here'bouts is t' gangs whut was here. Dogeye's bust two of um, an' Bunch says 'at's all's out here in this bare land.

"An' nen, this here city's hid. Does a gang pass by, an' you keep outa sight, they nev' know yu here. Them folks whut built this here Fort Goodhope knowed whut they was doin'—they was jest onlucky.

"I been all over the land, Nellmay, an' I ain't saw nuthin' like this here! We c'n *live* here, an' when I die they'll be *folks* 'steada varmints knowin' where my bones lie. 'Twill be a comfort in the few years I got lef'.

"An' yore kids'll grow up here, an' yu won't lose um all, like I did. You git Tommy back here. He

gotta go now—his head's all fulla thinkin'. But you keep edgin' back an' you'll git um. Come on, now. We git started."

XII.

They walked in silence through the quiet corridors that seemed to wait for a life that had departed from them forever. They went cautiously, alert for any lingering explorers or sentinels, but there was none but themselves in the passageways.

The girl carried most of the books Gram-mom had selected for preservation—a heavy stack of them that required both her arms to carry. Gram-mom held the torch in one hand, and, with the other, carried fresh faggots to replace it. One or two slender volumes she held between elbow and body.

Nellmay, like her uneasy tribesfolk, felt the eerie, haunted atmosphere of these deserted boulevards; her brown eyes flickered to the shadows on either side of their flaring torch—the dancing, velvet shadows that leaped forward or retreated with the changing yellow flame. The faint *hush-hush* of their moccasined feet, and the quiet purring of the flame, were the only sounds the girl was sure she heard. Yet all about her she seemed to feel a ghostly stir and rustle, that trembled on the edge of sound. It was probably the movement of the air through the ventilating tubes.

She followed Gram-mom up the ramp that led into the dome that was Dogeye's headquarters with a light gasp of relief. Through the windows she saw the light of many fires out upon the plain where her tribesfolk camped; and here and there a sentinel was outlined, black against the feeble light, pacing the parapet. It was good to see people, and the signs of people, after the cool, poised stillness of those quiet corridors. She set her stack of books carefully down upon one of the desks, and turned to sniff the damp night breeze, that, laden with the scent of earth and grass, drifted through the ruined windows.

They had extinguished all but a sliver of their torch. Gram-mom held it low, so that even its faint gleam would not be seen by the pacing guards. But its tiny light was enough for her sharp old eyes. She held it close to the cards in the nearest file case, and studied them, turning them over slowly at first, then more quickly.

"This ain't nuthin'," she said at last. "Here, I'll read yu one." She leaned close, peering. Then she read slowly: "'*Charles Henry Wickfield. Date of birth: August 17, 1943. Place of birth: Chi—Chi-caggo, Ill. Grad.: Chi. U.; U. P.*—' Lotta letters here; don't know whut they mean. Here's sum'pin'. '*1967–1970: Served with Co. I, 90th Penn. Volunteers. Col. Lyle, commanding.*' Fightin', I reckon. '*Entered Fort Goodhope, July 7, 1973*—' This ain't nuthin', Nellmay." She ran through adjacent cards; skipped to another file case, and went rapidly through it, and then another. She straight-

ened: "This here jus' t' records of the folks whut lived here; tells all 'bout um. Ain't nuthin' like books, tell Tommy. Ain't need t' bust um.

"Now these here books we're savin'. Look. We hide um here in these big boxes. Ain't nobody gonna bother um in there, ever."

Gram-mom pulled open the bottom drawer of one of the big green file cases. It came far out, exposing a considerable space behind the metal shield that supported the large index cards. Into this space she packed the books they had brought, wedging them tightly so there would be no revealing movement, no shifting or falling. With Nellmay's aid she pushed the big drawer shut. "Nobody ev' look back in there. You 'member where they are, an' git um for Tommy when yu come back.

"Now, you git goin', Nellgirl. Git back t' Tommy; he'll be luggin' all them bums by hisself, an' he gonna need whut strengt' he got fer runnin'. I'll sneak out t' camp, an' 'gin collectin' yore supplies. I'll meetcha at t' tree."

Nellmay stood, shifting from one slim foot to another. "Gram-mom, it ain't seem right 'bout them books. Tommy wants um bus'; says we ain't fit t' know—"

"Nellmay, you listen me! Ain't Tommy nor nobody gonna stop folks killin'. You old 'nough to see that. It's born in um! Lookit kids—apoundin' of each other soon's they's old 'nough to crawl! Killin's natural to folks, an' books ain't gonna make no difference. You look. Folks figgered out t' stuff in books afore, so I reckon they kin do it again yu give um time, and so be they ain't all crazy, or funny in the head like mos' the gangs.

"Take um a while, p'raps. Years an' years, most like. But when folks set they mind to killin', they work harder at it than they will at anything else. I live a long time, an' I know that fer a fact! They figger it all out again—"

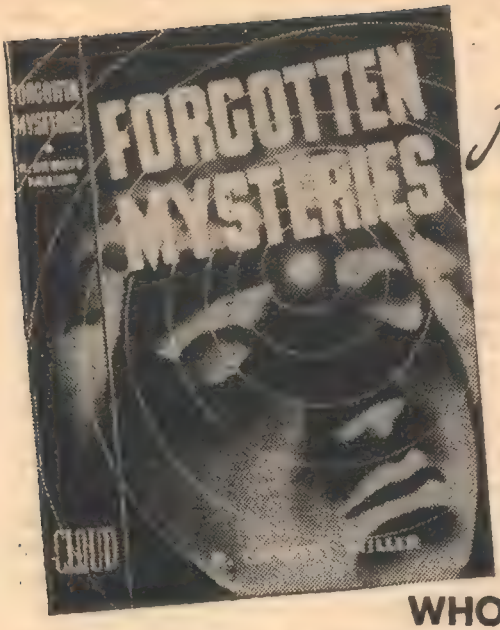
"Tommy says they won't! Says they ain't oney ones like Dogeye do any figgerin'! You said so, too!"

"Shore. Well, supposin' they cain't figger it again; they live like varmints, an' fergit ev'thing. They still gonna kill each other, an' whut difference it make how fas' they do it?"

"Make a lot," said Nellway, scowling with thought. "Could they run them wagons thet fly in the air, they fin' us an' kill us quick, like you tell 'bout this here city—"

"Yu make me tard, girl!" snapped Gram-mon, with sudden irritation. "Nobody's gonna fin' out how t' make them things f'um these books we snuck out! Told yu whut they was—growin' things, an' jogriffies, an' such. Now stop this here, an' git back to Tommy! He c'n bus' t' books 'fee wantsta, when yu come back. Now go on, git!"

Slowly, still scowling, the girl took the torch and went down the ramp, into the enduring darkness of the lower city. Gram-mom watched her. When the flickering light had finally vanished the old woman shook her head. "Shore



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sets a store by that there boy," she said. "An't no way start livin' with a man!" She slipped out through the broken doorway, and was lost in the darkness outside.

Nellmay found Tommy in the arsenal, his arms laden with explosives. She gave him Gram-mom's report on the index cards, and joined him in transporting the heavy bombs to the library. She tried to persuade him to stay there, while she returned for a second armload of explosives, but Tommy refused.

The boy was visibly weary, his hollow cheeks even more sunken, and his large, expressive eyes brilliant in the dark smudges of fatigue that surrounded them. Nellmay eyed him uneasily—she foresaw the possibility that all their equipment might have to be abandoned in this flight upon which they were about to embark; it was going to take some doing to get Tommy through it alive.

They worked for an hour, moving with cautious respect for their burdens. After the time bomb had been carried down to the library, Nellmay insisted that Tommy carry no more than the torch on their journeys from arsenal to library, pleading the danger of bringing the fire too close to the explosives.

At last the boy was satisfied. A pile of bombs was neatly stacked in the center of the library floor, the time bomb, set as Gram-mom had directed, lying across the top layer. It would detonate, Gram-mom had said, just about dawn, before the tribe had re-entered the city, and would, therefore, injure no one. It would give them a start of about six hours.

Tommy gave a last glance about the quiet, book-lined room, an unfathomable expression in his tired eyes. He stooped, picked up a volume lying near his foot, and held it, gripped it tightly between his hands. Nellmay, holding the torch, watched silently. The rotted, old leather creaked as Tommy opened it, carefully separating damp pages. He held it closer to the torch, and his lips moved as he read.

"Tommy!" said the girl.

"*'The con-conclusion is unavoidable,'*" the boy read aloud, "*'not only that the earth is one of the smaller members of the so-lar system, but that the sun itself is one of the smaller of the un-unnumb'rable stars that fill the im-men-sity of space. Thus it is evi-dent that the earth is an exceedingly small part of the created universe.'* See whut he says, Nellmay? The earth is oney little—ain't nuthin' much. Don't matter much whut we do, I reckon. But I wisht I knowed all 'at—whut it meant, an' all. Wisht I could read all these here books—"

"Come on!" exclaimed Nellmay, impatiently. "Tommy, come on! We gotta git goin'!"

Tommy stroked the book gently, and laid it carefully upon a table; then he followed the tall, blond girl who alone of the two gave any thought to the ordeal that lay before them.

Gram-mom was waiting for them when they reached the appointed tree, in the blackness of midnight. Nellmay gave voice to a low whistle —a signal between the three—and the old woman crept from the anonymity of the night, and the shadows.

"Here's yu stuff," she whispered, and Nellmay hastily strapped a heavy ammunition belt around her middle. She donned a warm jacket Gram-mom had brought her, and shouldered the larger of the two packs which had been brought to the tree in secret by some of their friends in the tribe.

"Whut's in this here?" she asked, brusquely.

"Bullets an' matches an' some dry meat. An' a can of wateh."

"Whut's in the other one?"

"Med'cine, an' a scraper, an' some knives—"

"Cain't take it," stated Nellmay, imperiously. "Tommy ain't carryin' nuthin'—"

"I'm all right, Nellmay!" protested Tommy, angrily. "We gonna need that!"

"Yu c'n take yu han' gun an' no more!" Her tone admitted of no argument. "It's loaded, an' I got more bullets fer it here."

"I brung his bow an' some arrers," said Gram-mom. Tommy grabbed them. "An' here's a ax. Yu gonna need a ax."

Nellmay took the ax and hung it on the pack strapped to her shoulders. "Come on, Tom."

"Nellmay, I'm afeared!" blurted Gram-mom. "Jen'll be after ye! You know Jen—the' ain't a better

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scout 'live 'an Jen. She'll fin' yu, Nellway!"

"I likes Jen," said the tall girl. "We been friends. But you tell her she ketch up with us I'm gonna kill 'er! You tell 'er, Gram! Tell 'er this is earnest! Now we's goin'!"

She strode off into the darkness. Gram-mom gripped Tommy tightly, and kissed him again. Then she let him go, and he went quickly after the girl. The old woman stood and listened until the faint *whoosh-whoosh* of their feet in the grass was gone entirely.

All night they went westward under the bright cold stars. They went without stopping, and passed down the gorges at the western edge of the mesa, and came out upon the desert again. Grass torches gave them light through the dark gorges: but out here on the desert, in the brilliance of the wide night, they needed none. In the distance coyotes called a little, and once they saw wild camels moving monstrously, grotesquely, against the stars that were still bright even near the horizon.

It was still and wide and silent with the moving, murmuring silence of night in the wilderness. And out here Man was forgotten. The desert neither knew nor cared for his passing.

At dawn Tommy halted them, and they turned and faced east. The rising sun cast their shadows far beyond them. The dawn wind picked up, and Nellmay's bright hair, glorious in the new sunlight, stirred with it. She leaned upon her rifle and waited, humoring Tommy, but indifferent to the thing for which he waited. Her eyes were blank, her mind casting ahead, debating, weighing their chances.

It came, not at dawn, but when the sun was almost a diameter above the far, dark line of the mesa they had left. A tiny, bright flash—Tommy hardly saw it—there, on the southern edge of the distance-diminished butte. A boiling of black smoke, larger, easily visible, followed the flash, climbing surprisingly high, rolling, swelling. And then it spread, and drifted away, began settling.

Moments later they heard the low rumble, and felt the jarring of the air.

"An' now it's done," said Nellmay, and swung her rifle under her arm. "An' we c'n be expectin' Jen right along now. But they ain't gonna git us, Tom! They ain't gonna git us!"

They turned and went on toward the blue west, where the snow-capped mountains shone in the light. Southward, the desert seemed to stretch on endlessly; to the north its queer cohorts, the wind-carved rocks stared out across that empty land like strange gods, grim with the rock-dust of centuries. Behind them the sun climbed, shedding a dry, motionless light. Not even a cloud stirred in the paling blue sky. On all the desert nothing moved but them. It seemed as though it had lain thus since time began.

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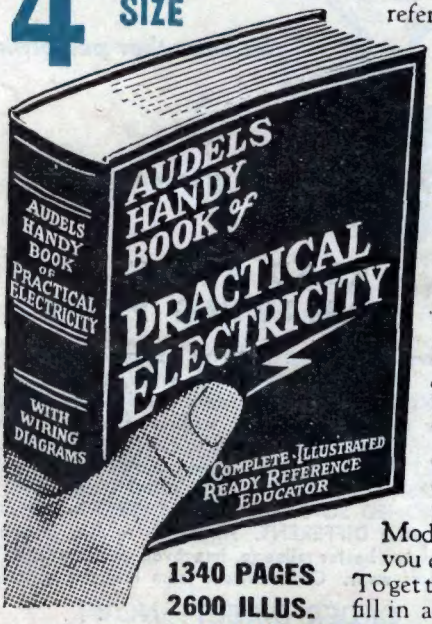
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